FEDERAL ELECTRIC CORPORATION
BIG RALLY II COMMUNICATION SYSTEM
TEST PROCEDURES
VOLUME III

ESD-TDR 64-451

IT&T service
FEDERAL ELECTRIC CORPORATION
an associate of
INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

FEDERAL ELECTRIC CORPORATION
BIG RALLY II COMMUNICATION SYSTEM
TEST PROCEDURES
VOLUME III

ESD-TDR 64-451

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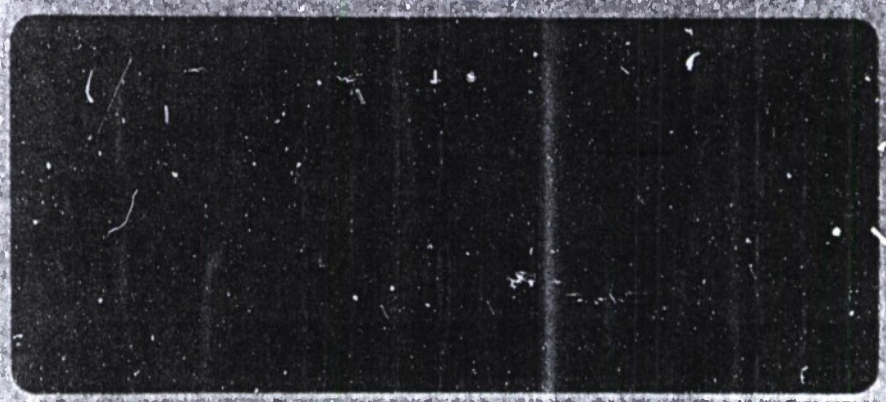

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FEE-2A (P)

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SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		ORIGINAL ISSUE		

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VOLUME III
TEST PROCEDURES
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272925

SCALE | FEC NO. | SHEET 1 OF 2

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

FEE-16A(F)

LIST OF MATERIALS

DRAWING NUMBER 6272925 2

ITEM NO.	QTY REQD	U OF M	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	
1			RADIO SET AN/TRC-35 TEST PROC	6272877	
2			LOS MICROWAVE MW503A TEST PROC	6272876	
3			RADIO SET AN/MR-80 TEST PROC	6272878	
4			RADIO SET AN/MRC-85 TEST PROC	6272879	
5			RADIO SET AN/FRC-39 TEST PROC	6272894	
			Errata sheets applicable to original editions have		
			been incorporated herein.		

VOLUME III TEST PROCEDURES

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CODE IDENT. NO. 14842 | DWG SIZE A | LM 6272925

FEC NO. | SHEET 2

DWG NO. 6272876 REV A

FEE-2A (P)

A ORIGINAL ISSUE	REVISIONS		
SYM	ZONE	DESCRIPTION	DATE	APPROVED

SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR	A	A	A	A	A	A	A																		
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ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

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LOS MICROWAVE MW 503 A
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6272876

1. SCOPE

1.1 This section outlines the testing procedures for the LOS microwave, MW-503A.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The Microwave Equipment must be properly installed and have been placed into operation prior to the performance of the test procedure in accordance with manufacturer's manual.

3.2 Testing procedures will be performed on equipment properly installed with all signal power connections complete.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 Transmitter, 52F4-MW

5.1.1 Klystron Beam Current - RF Power Output

5.1.2 RF Frequency and AFC

5.2 Receiver, 55IF-6

5.2.1 Klystron Beam Current

5.2.2 IF Amplifier Noise Level-Receiver Sensitivity

5.2.3 IF Amplifier Deviation Sensitivity

5.3 Transmission Line

5.3.1 Waveguide VSWR

5.4 Alarm Tests

5.5 LOS Micrwave, MW-503A, Link Tests

5.5.1 Diversity Equipment (Frequency or Space Diversity System Only) Pilot Tone Level and Deviation

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Test Procedures LOS Microwave MW 503A	CODE IDENT. NO. 14842	DWG. SIZE A	6272876	A
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5.5.2 Diversity - Switchover Equipment (Hot-Standby System Only) - Pilot Tone Level and Deviation

5.5.3 Baseband Level and Frequency Response

5.5.4 Order Wire Level and Frequency Response

5.5.5 Intermodulation Distortion

5.5.6 Net Path Loss

5.5.7 Signal-to-Noise Ratio

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on the attached Data Sheets.

6.2 Most of the test levels that are to be recorded on the Data Sheets are measured on 75 Ohm circuits. The VTVM is calibrated to read in dbm across 600 ohm circuits. Thus while using this VTVM to determine 75 ohm circuit levels, a correction factor of 9 db must be added to the actual meter reading to obtain dbm. IN ALL such cases in this procedure, record the uncorrected ACTUAL meter indication as read on the VTVM. The EXPECTED levels on the Data Sheets are given as the actual meter reading.

7. TRANSMITTER, 52F4-MW (DATA SHEET BRII/81)

7.1 RF Power Output

7.1.1 Test Equipment

A. Microwave Power Meter, HP-431A

B. Thermistor Mount, HP-478A

C. Adapter, Waveguide - N Female, HP-H281A

D. Attenuator, Variable Waveguide, HP-H375A

7.1.2 Procedure

A. Place the TX ON-OFF Switches of both Transmitters ("A" and "B") in the OFF position.

B. Connect the test equipment as shown in Figure 1 according to the type of diversity employed.

C. Set the Variable Attenuator, HP-H375A, for 10 db. of attenuation.

D. Place the Power Meter, HP-431A, controls in the following position:

1. Input Z - As marked on Thermistor Mount, HP-478A

2. Range - as required

3. Zero Adjust - as required

E. Place the TX ON-OFF Switch of Transmitter "A" on the ON position.

F. Place the Power Selector Switch, located on the Transmitter "A" Metering Panel, in the TX1 position. Record the TX Klystron Beam Current reading of Meter M102 (right-hand meter) on the Data Sheet.

G. Note the Power Meter, HP-431A, indication. Calculate the Transmitter Power in the following manner:

Add the Power Meter indication, the loss of the directional coupler (obtained from the decal on the coupler name-plate), and the attenuation of the Variable Attenuator.

EXAMPLE:		
Power Meter Indication	-	-1 dbm
Direction Couplers Loss	-	20 db
Attenuator Setting	-	10 db
TX Power Output	-	+29 dbm

H. Place the TX ON-OFF Switch of Transmitter "A" in the OFF position.

I. Repeat Steps E through H for Transmitter "B" for a Hot Standby or Frequency Diversity configuration. A different test equipment set up is required for a Space Diversity configuration, this repeat steps B through H for Transmitter "B" of a Space Diversity System.

7.2 RF Frequency and ACF

7.2.1 Test Equipment

A. Frequency Counter, HP-524D or equivalent

B. Transfer Oscillator, HP-540B

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C. Adapter, HP-H281A

D. Cable (for use above 4GC), HP-AC16Q

7.2.2 Procedure

A. Record the assigned operating frequency code of Transmitter "A" as it appears on the Transmitter waveguide or nameplate.

B. Place the TX ON-OFF Switches of both Transmitters ("A" and "B") in the OFF position.

C. Connect the test equipment as shown in Figure 2 according to the type of diversity employed.

D. Place the TX ON-OFF Switch of Transmitter "A" in the ON position.

E. Adjust the Level Control on the Transmitter "A" 78A1-MW AFC Alarm for an indication of 10 on Meter M-1 and set the adjustable contact on M-1 to 0.

F. With Transmitter "A" and associated AFC equipment properly aligned and with the AFC "ON", measure and record on the Data Sheet the transmitter operating frequency.

Note: 1. All modulation except pilot signal must be removed from the modulator while making frequency measurements.

2. The reference cavity must have been set within ±0.002% when the transmitter was swept.

G. Place the AFC ON-OFF Switch in the "OFF" position and detune the Repeller-Fine Control in the CW direction for an indication of 5 on the Transmitter "A" 78A1-MW Alarm Unit Meter.

H. Turn the AFC Switch ON and after 10 seconds, record the reading of Meter M1 of Transmitter "A" 78A1-MW AFC Alarm Unit on the Data Sheet.

I. Turn the AFC Switch OFF and detune the Repeller Fine Control in a CCW direction for a reading of 5 on the Transmitter "A" 78A1-MW Alarm Unit Meter.

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J. Turn the AFC Switch ON and after 10 seconds, record the reading of Meter M-1 of the Transmitter "A" 78A1-MW AFC Alarm Unit on the Data Sheet.

K. Tune Transmitter "A" back to operating frequency. Set the 78A1-MW AFC Unit Meter to 10 by use of the Level Control, if necessary. Set the adjustable alarm contact to 5.

L. Place the TX ON-OFF Switch of Transmitter "A" in the OFF position.

M. Repeat Steps A, D, through J for Transmitter "B" for a Hot Standby or Frequency Diversity Configuration. A different test equipment set-up is required for a Space Diversity Configuration, thus repeat steps A, C through J for Transmitter "B" of a Space Diversity System.

8. RECEIVER, 55IF-6 (DATA SHEET BRII/82)

8.1 Klystron Beam Current

8.1.1 Test Equipment - None required

8.1.2 Procedure

A. With the MX1 - LOI Switch of Receiver "A" in the LOI position, note and record on the Data Sheet the reading on Meter M202 (Right-hand Meter).

B. Repeat Step "A" for Receiver "B".

8.2 Receiver Sensitivity

8.2.1 Test Equipment

A. Adapter, IF Input, Collins Part No. 562 8839 003.

B. Generator, SHF Signal HP 620A.

C. VTVM, HP 400 D.

D. Adapter, Waveguide - N Female, HP - H281A

E. Cable, HP AC-16B.

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F. Cable, above 4GC, HP-AC-16Q.

G. Transfer Oscillator, HP 540B.

H. Frequency Counter, HP 524D.

8.2.2 Procedure

A. The distant transmitter must be turned off in order to prevent its signal from interfering with the test.

B. Frequency Diversity or Space Diversity - place the service switch, located on the diversity shelf, in the "A" Disable position. Hot Standby - set the Test Switch, located on the Switch-Over (SW/O) Test Unit, in the A Test position.

C. Place the meter switch, S203, located on the front panel of Receiver A, in the RX1 position.

D. At Receiver A, disconnect the male BNC connector from the Mixer Output, J-205.

E. Connect the end of the IF Input Adapter marked IF to the male BNC connector just removed from the Mixer Output. Record the reading of Meter M201 (Left-hand meter) of Receiver A on the Data Sheet.

F. Connect the VTVM, HP400D, to the OUTPUT jack of the IF Amplifier of Receiver A and read the noise level. Refer to Figure 3. Record this level on the Data Sheet.

G. Connect the test equipment as shown in Figure 4. Disconnect the IF Input Adapter from the IF Amplifier input cable and reconnect the input cable to the Receiver A Mixer Output, J205.

H. Tune the SHF Signal Generator, HP 620A, to the exact operating frequency of Receiver A, using the Transfer Oscillator, HP540B, and Frequency Counter, HP524D. Set the Generator OUTPUT ATTENUATOR for maximum attenuation. Put the Generator MOD SELECTOR in the CW position.

I. Keeping the Generator output adjusted properly, decrease the attenuation of the Generator OUTPUT ATTENUATOR until the Receiver A noise output, as read on the VTVM, HP400D, decreases by 3 db.

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J. Calculate the 3 db Quieting Sensitivity of Receiver A in the following fashion:

Subtract the insertion loss of the cable and adapter (approximately 2.5 db) and the loss of the directional coupler (obtained from the decal on the coupler nameplate) from the Signal Generator Output, as accurately determined from the ATTENUATOR DIAL.

EXAMPLE:

SHF Sig Generator Output	- 65.5dbm
Directional Coupler Insertion Loss	- 19.0db
Cable and Adapter Insertion Loss	- 2.5db
3 db Quieting Sensitivity	-87.0dbm

Record the calculated Sensitivity on the Data Sheet.

K. Turn on the distant transmitter. Return Receiver A to normal operation.

L. Repeat Steps A through K for Receiver B.

8.3 I-F Amplifier Deviation Sensitivity

8.3.1 Test Equipment

A. Deviation Calibrator, Collins 477Z-2

B. Adapter, I-F Input, Collins 562-8839-003.

C. VTVM, HP 400 D

D. Cable, Banana - BNC, HP AC-16B.

8.3.2 Procedure

A. Disconnect the I-F Input Cable from the Mixer Output, J205, of Receiver A and connect to the I-F Input Adapter. Connect the remaining test equipment as shown in Figure 5.

B. Set the Deviation Calibrator, 477Z-2, FUNCTION SWITCH to the CAL position.

C. Turn the ON-OFF Switch on the Calibrator to the ON position and allow time for warm-up.

D. Set the VTVM, HP400D, to the -10 db scale and note the reading. Subtract -14.2 db from this reading and record the value, as Deviation Sensitivity, on the Data Sheet.

EXAMPLE: VTVM Reads - 15.2 db, therefore the Deviation Sensitivity will be -1.0 db.

(-15.2 db - [-14.2 db] = -1.0 db)

E. Return Receiver A to normal operation.

F. Repeat Steps A through E for Receiver B.

9. TRANSMISSION LINE (DATA SHEET BRII/ 83)

9.1 Waveguide VSWR Measurement

9.1.1 Test Equipment

A. Sweep Oscillator, HP-H01 686C

B. Directional Coupler, HP-H752C

C. Directional Coupler, HP-H752D

D. Adapter, W/G - N, HP-H281A

E. Attenuator, Variable W/G, HP-H375A

F. Adjustable Short, HP-H920A

G. Cable, Use above 4KMC, HP-AC16Q

H. Ratio Meter, HP 416A

I. (2) Crystal Detectors, Matched Pair, HP-H421A

9.1.2 Procedure

A. Set up the equipment as shown in Figure 6, with the Adjustable Short, HP-H920A connected to the Directional Coupler, HP-H752C.

B. Turn on the Ratio Meter, HP416A. Place the EXCESS COUPLER LOSS switch in the 10 db position.

C. Adjust the Variable Attenuator, HP-H375A, for 6 db.

D. Adjust the Sweep Oscillator, HP-H01 686C, in the following fashion:

SWEEP SELECTOR - OFF; AMPL MOD SELECTOR - INT (1000 cps). Turn on the Oscillator.

NOTE - Connect the BNC cable from the Incident Crystal Detector of the coupler to the Frequency Counter to insure 1 Kc internal modulation.

E. Disconnect the BNC cable from the Ratio Meter REFLECTED/PROBE input. If the RF POWER MONITOR tuning eye shadow does not move, increase the signal level. If Shadow moves, appreciably, without overlapping, proceed with the calibration, Step F. An overlapping show indicates an overload. Signal level adjustment can be made using the Variable Attenuator, HP H375A.

F. The following calibration procedure is for a single frequency. Adjust the Sweep Oscillator to the frequency of the transmitter connected to the transmission line that is to be tested. Calibrate the Ratio Meter, HP-416A, in the following manner:

1. Connect the Adjustable Short, HP-H920A to the end of the waveguide, refer to Figure 6.

2. Place the Ratio Meter RANGE switch in the 0 db 100% position.

3. Adjust 416A SET TO FULL SCALE control for convenient reference on PERCENT REFLECTION (REFLECTOMETER) scale; 90 is recommended.

4. Slide short while noting maximum and minimum indications on reflectometer scale.

5. Subtract minimum reading from maximum, and divide by two.

   FOR EXAMPLE: If maximum and minimum readings noted while the short is slid are .89 and .93 respectively:

   The difference is .04 and half the difference is .02.

6. Slide short to get minimum indication again.

7. Adjust SET TO FULL SCALE to obtain a meter indication which is equal to the reflection coefficient of the calibrating load (100 minus the quantity obtained in step (5).

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(For the values used above, SET TO FULL SCALE would be adjusted to obtain a meter indication of .98).

G. Connect the directional couplers to the transmission line as close as possible to the microwave equipment. It may be necessary to remove a section of the existing waveguide to provide adequate space to install the test equipment. The transmission waveguide must be pressurized when the VSWR measurement is made.

H. The PERCENT REFLECTION (REFLECTOMETER) scale on the Ratio Meter is used for these tests. The percent reflection is converted to VSWR by use of the following relationship:

$$\text{VSWR} = \frac{10 + \sqrt{R\,\%}}{10 - \sqrt{R\,\%}}$$

Example: Percent Reflection = 1.0%

$$\text{VSWR} = \frac{10 + \sqrt{1.0\%}}{10 - \sqrt{1.0\%}} = \frac{11}{9} = 1.22{:}1$$

Determine the VSWR at every frequency, both transmit and receive, associated with the waveguide run under test, as indicated on the Data Sheet. Both waveguide runs of a Space Diversity System must be tested. Record all the VSWR measurements on the Data Sheet in the appropriate place, determined by the type of diversity employed at the station.

I. Restore the waveguide runs to their normal configuration.

10. ALARM TESTS (DATA SHEET BRII/84)

10.1 Test Equipment - None required

10.2 Procedure

A. The following steps indicate the Alarm Systems that are to be checked along with the methods of failure simulation required to activate the alarm. The Data Sheet contains the result requirements with check lists. All equipment should be ON and functioning properly before these tests are started.

NOTES: 1. A "P" Rack is a powered rack while a "N" Rack is a non-powered rack, receiving its power from the "P" rack.

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2. Simulated power failures should be performed by operation of the circuit breakers. On the 20 V DC Power Supplies, the Alarm Lamp will not light when power is turned off. On these units, turn power off, block the relay in the De-energized position, turn power on, and check the alarm lamp, remove the relay block when alarms are verified.

B. "A" Power Failure - Turn "A" Circuit Breakers OFF. Refer to the Data Sheet for required results and check list. Restore power after observations.

C. "B" Power Failure - Turn "B" Circuit Breakers OFF. Refer to the Data Sheet for required results and check list. Restore power after observations.

D. "A" Modulation Alarm - Note reading of "A" AFC Pilot Level Meter then rotate level ADJ Control on "A" Reference Amplifier for -6.5 db on meter. Return to normal after test.

E. "B" Modulation Alarm - Note reading of "B" AFC Pilot Level Meter then rotate level ADJ Control on "B" AFC Reference Amplfier for -6.5 db on meter. Return to normal level after test.

F. "A" Power Alarm - On "A" AFC Alarm unit, rotate red vane on meter to make contact with black vane. Reset Alarm Vane after test to one-half normal power output or 3 db point.

G. "B" Power Alarm - On "B" AFC Alarm Unit rotate red vane on meter to make contact with black vane. Reset alarm vane after test to one-half normal power output or 3 db point.

11. LOS MICROWAVE, MW-503A, LINK TESTS (DATA SHEET BR/85)

11.1 Diversity Equipment Tests (Frequency or Space Diversity Systems only) - Pilot Tone and Deviation.

11.1.1 Test Equipment

A. Selective Voltmeter, Sierra 125B

11.1.2 Procedure

A. The distant transmitter must be transmitting a correctly adjusted 308Kc Pilot Tone to the receivers feeding the diversity equipment. The local receiver must be functioning normally.

B. Tune the Selective Voltmeter, Sierra 125B, to the Pilot Tone frequency 308Kc. Set the FUNCTION SELECTOR to SEL VM (250 cps). Put the LINE IMPEDANCE switch to 600 ohms. Connect the Input terminals for an unbalanced line by placing the ground strap on the lower terminal.

C. Connect the Selective Voltmeter to the A IN jack and GRD jack on the diversity equipment Control Panel. Read the Pilot Tone level from Receiver A and record it on the Data Sheet.

D. Connect the Selective Voltmeter to the B IN jack and GRD jack on the diversity equipment Control Panel. Read the Pilot Tone level from Receiver B and record it on the Data Sheet.

E. Connect the Selective Voltmeter to the SIG OUT jack and GRD jack on the diversity equipment Control Panel. The Voltmeter should still be tuned to 303Kc.

F. Move the SERVICE SWITCH to the A-DISABLE position. (The A SW ALARM lamp should light). Read the Pilot tone level from the SIG OUT jack and record it on the Data Sheet.

G. Return the SERVICE SWITCH to the center position, wait approximately 5 seconds, and then move the service switch to the B-DISABLE position. (The A SW ALARM lamp should go off and the B SW ALARM lamp should light.) Read the Pilot Tone level from the SIG OUT jack and record it on the Data Sheet.

H. Return the SERVICE SWITCH to the center position. (Both SW ALARM lamps should go off).

I. With the Selective Voltmeter connected as in Step E, note and record on the Data Sheet the change in Pilot Tone level caused by turning off all "A" Circuit Breakers. Restore the "A" Breakers after the test.

J. With the Voltmeter connected as in Step E, note and record on the Data Sheet the change in Pilot Tone level caused by turning off all "B" Circuit Breakers. Restore the "B" Breakers after the test. Disconnect the Voltmeter.

11.2 Diversity-Switchover Equipment Tests (Hot-Standby System Only) Pilot Tone Level and Deviation

11.2.1 Test Equipment

A. Selective Voltmeter, Sierra 125B.

11.2.2 Procedure

NOTE: The outputs of diversity units connected directly to pilot stop filters cannot be adjusted properly unless the connector at J101 on the diversity unit is disconnected and J101 terminated with 75 ohms for the following procedure.

A. The distant transmitter must be transmitting a correctly adjusted 308 KC Pilot Tone to the receiver feeding the diversity equipment. The local receiver must be functioning normally.

B. Tune the Selective Voltmeter, Sierra 125B, to the Pilot Tone frequency 308 Kc. Set the Function Selector to SEL VM (250 cps). Put the Line Impedance switch to 600 ohms. Connect the Input terminals for an unbalanced line by placing the ground strap on the lower terminal.

C. Set the Switchover Test Unit, 18B1-MW, control to the "B" TEST position. Connect the Selective Voltmeter to the A IN jack and GRD jack on the diversity equipment control panel. Read the Pilot Tone level from Receiver A and record it on the Data Sheet.

D. Set the Switchover Test Unit, 18B1-MW, control to the "A" TEST position. Connect the Selective Voltmeter to the B IN jack and GRD jack on the diversity equipment Control Panel. Read the Pilot Tone level from Receiver B and record it on the Data Sheet.

E. Connect the Selective Voltmeter to the SIG OUT jack and GRD jack on the diversity equipment Control Panel. The Voltmeter should still be turned to 308 Kc.

F. Move the SERVICE SWITCH on the diversity equipment auxiliary Control Panel to the A-DISABLE position and the Switchover Test Unit Control to a TEST position. (The SW ALARM lamp should light. The TEST and the B IN-SERVICE lamps on the Switchover Unit should be lit.) Read the Pilot Tone level from the SIG OUT jack and record it on the Data Sheet.

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G. Return the SERVICE SWITCH on the diversity equipment auxiliary Control Panel to the center position, wait approximately 5 seconds, and then move the SERVICE SWITCH to the B-DISABLE position. Set the Switchover Test Unit test switch to B TEST position. (The A SW ALARM lamp should extinguish and the B SW ALARM lamp should light. The B TEST and the A IN-SERVICE lamps on the Switchover Units should be lit.) Read the Pilot Tone level from the SIG OUT jack and record it. on the Data Sheet.

H. Return the Service Switch to the center position. Set the test switch to the NORMAL position. (Both SW ALARM lamps should extinguish. The A IN-SERVICE lamp on the Switchover Control Unit should be lit.)

I. With the Selective Voltmeter connected as in Step E, note and record on the Data Sheet the change in Pilot Tone level caused by turning off all "A" Circuit Breakers. Restore the "A" Breakers after the test.

J. With the Voltmeter connected as in Step E, note and record on the Data Sheet the change in Pilot Tone level caused by turning off all "B" Circuit Breakers. Restore the "B" Breakers after the test. Disconnect the Voltmeter.

11.3 Base Band Level and Frequency Response

11.3.1 Test Equipment

A. Audio Oscillator, HP 200 CD

B. VTVM, HP 400D

C. Termination, 75 ohm Resistor

11.3.2 Procedure (See 11.3.3 for GA-GPA Link)

NOTE: The order wire should not be used while link measurements are being made.

A. Transmit Station - Disconnect the jumper cable from jack J6 on the front of the RF Patch Panel, 499J-3. Connect the VTVM, HP400D, across the output of the oscillator. Adjust the oscillator for an output of -44 db as read on the VTVM at a frequency of 100 Kc. This frequency is the reference used throughout the test.

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B. Receive Station - disconnect the jumper cable from jack J8 on the front of the RF Patch Panel, 499J-3. Connect the VTVM to jack J8. Place a 75 ohm resistor across the input terminals of the VTVM. Record on the Data Sheet the 100 Kc level as read on the VTVM.

C. Transmit Station - vary the oscillator from 60 kc to 500 Kc in steps as indicated on the Data Sheet, while keeping the oscillator output CONSTANT at -44 db as monitored on the VTVM.

D. Receive Station - record on the Data Sheet the test frequency levels as read on the VTVM.

E. The two stations in the link should now reverse their roles of transmitting and receiving of the baseband test frequencies and repeat sections A through D.

F. Return the equipment to normal operation.

11.3.3 Procedure for GA-GPA Link Only (Data Sheet BRII/86)

NOTE: The order wire should not be used while the link measurements are being made.

A. At site GA - disconnect the jumper cable from jack J7 on the front of the RF Patch Panel, 499 J-3. Connect the Audio Oscillator, HP 200 CD, to Jack J7. Connect the VTVM, HP 400D, across the output of the oscillator. Adjust the oscillator for an output of -19 db as read on the VTVM at a frequency of 100 kc. This frequency is the reference used throughout the test.

B. At Site GPA - disconnect the jumper cable from jack J3 on the front of the RF Patch Panel 499 J-3. Connect the VTVM to Jack J3. Place a 75 ohm resistor across the input terminals of the VTVM. Record on Data Sheet BRII/86 the 100 kc level as read on the VTVM.

C. At Site GA - vary the oscillator from 12 kc to 500 kc in steps as indicated on the Data Sheet, while keeping the oscillator output CONSTANT at -19 db as monitored on the VTVM.

D. At Site GPA - record on the Data Sheet the test frequency levels as read on the VTVM.

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E. At Site GPA - disconnect the jumper cable from Jack J6 on the front of the RF Patch Panel 499 J-3. Connect the Audio Oscillator, HP 200 CD, to jack J6. Connect the VTVM, HP 400D, across the output of the oscillator. Adjust the oscillator for an output of -44 db as read on the VTVM at a frequency of 100 kc. This frequency is the reference used throughout the test.

F. At Site GA - disconnect the jumper cable from Jack J5 on the front of the RF Patch Bay, 499 J-3. Connect the VTVM to Jack J5. Place a 75 ohm resistor across the input terminals of the VTVM. Record on the Data Sheet the 100 kc level as read on the VTVM.

G. At Site GPA - vary the oscillator from 12 kc to 500 kc in steps as indicated on the Data Sheet, while keeping the oscillator output CONSTANT at -44 db as monitored on the VTVM.

H. At Site GA - record on the Data Sheet the test frequency levels as read on the VTVM.

I. Return all equipment to normal operation.

11.4 Order Wire Level and Frequency Response

11.4.1 Test Equipment

A. Audio Oscillator, HP 200 CD

B. VTVM, HP 400 D

11.4.2 Procedure

A. Transmit Station - connect the equipment as shown in Figure 7. Adjust the Audio Oscillator, HP 200 CD, for a frequency of 1 Kc with an output of -20 dbm as read on the VTVM, HP 400 D.

B. Receive Station - connect the equipment as shown in Figure 7. Record on the Data Sheet the Demodulator output as read on the VTVM, HP 400 D.

C. Transmit Station - vary the Audio Oscillator frequency from 300 CPS to 12 Kc in steps indicated on the Data Sheet. The Oscillator output level must be kept constant at -20 dbm as read on the VTVM.

D. Receive Station - record on the Data Sheet the Demodulator output level as read on the VTVM.

E. The two stations of the link should now reverse their roles of transmitting and receiving. Repeat Steps A through E.

F. Return the equipment to normal operation.

11.5 Intermodulation Distortion Test

11.5.1 Test Equipment

A. Signal-to-Noise Test Set, Collins 476B-1.

B. Noise Loading Test Set, Collins 476C-1.

C. VTVM HP 400D.

D. Adapter, Tee, BNC.

E. Termination, 180 ohm, 1/2 W Resistor

11.5.2 Procedure

NOTE: The transmitter and receiver must have been properly tuned and the system level adjustments completed before the test can be started. No modulating signals, except Pilot should be present.

A. Transmit Station - disconnect the BNC jumper cable from J1 on the front of the RF Patch Panel, 499J-3. Mount the BNC tee adapter on J1 and reconnect the BNC jumper cable to one side of the adapter. Connect the output from the Noise Loading Test Set to the other end of the tee adapter. Use a tee adapter on the OUTPUT jack of the Noise Loading Test Set and connect the VTVM, HP 400 D, to the output jack. Use the short cable for this connection. Refer to Figure 8.

B. Adjust the Noise Loading Test Set in the following manner:

1. Set the 455 Kc NOTCH Switch to the OUT position.

2. Set the LO PASS FILTER switch to the 1200 Kc position.

3. Set the 308 Kc notch switch to the IN position.

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4. Set the HIGH PASS FILTER switch to the IN position.

5. Adjust the LEVEL control on the noise measuring test set for a reading of -33 db as read on the VTVM.

C. Receive Station - disconnect the BNC jumper cable for J3 on the front of the RF Patch Panel, 499-J-3. Connect the IN jack of the Signal-to-Noise Test Set to J3 on the R-F Patch Panel, using a BNC Tee Adapter with a 180 ohm resistor attached. Connect the VTVM to the OUT jack of the Signal-to-Noise Test Set. Refer to Figure 8. Set the attenuators and the LEVEL ADJ control for a reading of -40 db as read on the VTVM. Note the attenuation remaining in the attenuators.

D. Transmit Station - place the 455 Kc NOTCH switch to the IN position.

E. Receive Station - remove attenuation by operating the "ATTENUATION IN DB" controls until the VTVM again indicates -40 db. DO NOT change the setting of the LEVEL ADJ control.

F. Determine the amount of attenuation removed in Step F and record it on the Data Sheet. This value is the inter-modulation product in db.

G. The two stations involved in this test should nowreverse their roles of transmitting and receiving and repeat Steps A through G.

H. Restore all equipment to normal operation.

11.6 Net Path Loss (NPL) Measurement

11.6.1 Test Equipment

A. Generator, SHF Signal, HP 720A

B. Transfer Oscillator, HP 540B

C. Frequency Counter, HP 524 C

D. Adapter, Waveguide - N Female, HP - H281A.

E. Cable, above 4GC, HP-AC-16Q.

11.6.2 Procedure

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NOTE: 1. Before NPL measurement is attempted, the transmitter of the test link must be functioning properly with the required power output.

2. This measurement should be performed when propogation fading is at a minimum. This usually occurs around mid-day.

3. The NPL must be determined for both directions of transmission.

A. Place the Receiver A meter switch, S 203, located on the receiver front panel, in the RX 3 position. CAREFULLY note the Meter M 201 (left-hand meter) of Receiver A. For a Frequency Diversity or Space Diversity Configuration repeat and CAREFULLY note this meter reading for Receiver B.

B. Frequency Diversity or Space Diversity Configuration - Place the SERVICE SWITCH, located on the Diversity Shelf, in the A DISABLE position. Hot Standby Configuration - Place the TEST SWITCH, located on the Switch-Over (SW/O) Test Unit in the A TEST Position.

C. Have all the distant transmitters of this test link turned off in order to prevent their signals from interfering with the following measurements.

D. Set up the test equipment for Receiver A as shown in Figure 4.

E. Tune the SHF Signal Generator, HP 620A, to the exact operating frequency of Receiver A, using the Transfer Oscillator, HP 540B, and the Frequency Counter, HP 524D. Set the Generator OUTPUT ATTENUATOR for maximum attenuation. Put the Generator MOD SELECTOR in the CW position.

F. Keeping the Generator output adjusted properly, decrease the attenuation of the Generator OUTPUT ATTENUATOR until the reading of Meter M201 of Receiver A is the same as that obtained in Step A, Receiver A. Be certain that the meter switch S203 is in the same position as in Step A, namely, RX3.

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G. Calculate the Received Signal Power in the following fashion:

Subtract the directional coupler insertion loss (obtained from the decal on the coupler nameplate) and the insertion loss of the cable and adapter (approx. 2.5 db) from the SHF Signal Generator Output (obtained from the Generator ATTENUATOR DIAL).

EXAMPLE: SHF Sig Generator Output -20.0dbm
Directional Coupler Insertion Loss -19.0db
Cable and Adapter Insertion Loss - 2.5db

Received Signal Power, Rec A -41.5dbm

Record this Received Signal Power, Rec A, on the Data Sheet.

H. For a Hot Standby Configuration, Received Signal Power, Rec B is the same as measured for Receiver A and should be recorded on the Data Sheet as such. Restore Hot Standby Configuration equipment to normal operation.

For a Frequency Diversity Configuration, repeat Steps B, C, E, F and G to determine and record on the Data Sheet the Received Signal Power, Rec B.

I. Calculate the Net Patch Loss (NPL), Path A in the following manner:

Subtract the Received Signal Power, Rec A (calculated in Step G) from the appropriate distant Transmitter Power (calculated in Section 7.1 of this procedure by the other station participating in this link test.) BE CERTAIN that the distant Transmitter Power obtained is from the transmitter used in the link measurement of Step A.

Example: Distant Transmitter Power - +28.0 dbm
Received Signal Power - (-41.5)dbm

NPL, Patch A - 69.5 db

Record the NPL, Path A, on the Data Sheet.

J. For a Hot Standby Configuration only one NPL measurement is required; therefore, this test is completed.

For the Frequency Diversity and Space Diversity Configuration calculate the NPL, Path B by repeating Step 1, using the Received Signal Power, Rec B.

NOTE: The same distant transmitter is used for both patches of a Space Diversity System; therefore, the distant Transmitter Power will be the same in both NPL calculations. Two distant transmitters are used in the Frequency Diversity System, so the distant Transmitter Power will be DIFFERENT for each NPL calculation.

K. Restore all equipment to normal operation.

11.7 Signal-To-Noise Ratio Measurement

11.7.1 Test Equipment

A. Test Oscillator, HP 200 CD

B. Selective Voltmeter, Sierra 125B

C. VTVM, HP 400 D

D. Signal-To-Noise Test Set, Collins 476B-1.

11.7.2 Procedure

NOTE: All the link adjustment procedures must be successfully completed before attempting this test.

A. Have the MUX INPUT to the distant transmitters of the test link temporarily disconnected by removing the cable connected to J2 on the RF Patch Panel, 499J-3. The Pilot Tone and Order Wire will remain connected.

B. Disconnect the cable from the OUTPUT jack on the IF Amplfier Panel of Receiver B.

C. Connect the Selective Voltmeter, Sierra 125A, between the SIG OUT AND GRD jacks on the Diversity auxiliary Control Panel. Tune the Selective Voltmeter to the Pilot Tone Frequency, 308 Kc. Set the FUNCTION SELECTOR to SEL VM (250 cps). Put the LINE IMPEDANCE Switch to 600 ohms. Connect the INPUT terminals for an unbalanced line by placing the ground strap on the lower terminals. Measure the pilot frequency level on the Selective Voltmeter by tuning the Voltmeter for a maximum reading at approximately 308 Kc on the dial.

D. Connect the input of the 476B-1 Signal-to-Noise Test Set across the Selective Voltmeter. Recheck and note the pilot level on the Selective Voltmeter.

E. Connect the output from the Audio Oscillator, HP 200 CD, across the Selective Voltmeter. The Oscillator terminals are to be connected for unbalanced operation by placing the ground strap on the appropriate terminals. Temporarily connect the VTVM, HP 400D, to the Oscillator terminals for correct Oscillator output adjustment. Set the Oscillator to 455 Kc for -40 db as read on the VTVM plus the difference in pilot level noted in Steps C and D.

FOR EXAMPLE: If the pilot level dropped 3 db when the 476B-1 was connected in Step D, the Oscillator should be adjusted for -43 db output.

F. Insert 80 db of attenuation in the 476B-1.

G. Connect the VTVM, HP 400D, across the output of the 476B-1 and adjust the output level control of the 476B-1 for a reading on the VTVM equal to the value determined in Step E.

H. Remove the test oscillator.

I. Remove the attenuation from the 476B-1 until the VTVM, HP 400D, reads the level determined in Step E. The Signal-to-Noise Ratio is 80 minus the attenuation remaining in the 476B-1. This Signal-to-Noise Ratio is for Receiver A and should be recorded as such on the Data Sheet.

J. Reconnect the cable to the OUTPUT jack of the IF Amplifier of Receiver B. Disconnect the cable from the OUTPUT jack of the IF Amplfier of Receiver A.

NOTE: 1. In a Hot Standby Configuration, the system should automatically switch to Receiver B.

2. Be certain the condition obtained in Step A is still in effect.

K. Repeat Steps C through I to obtain and record on the Data Sheet the Signal-to-Noise Ratio for Receiver B.

L. Restore all the equipment to normal operation.

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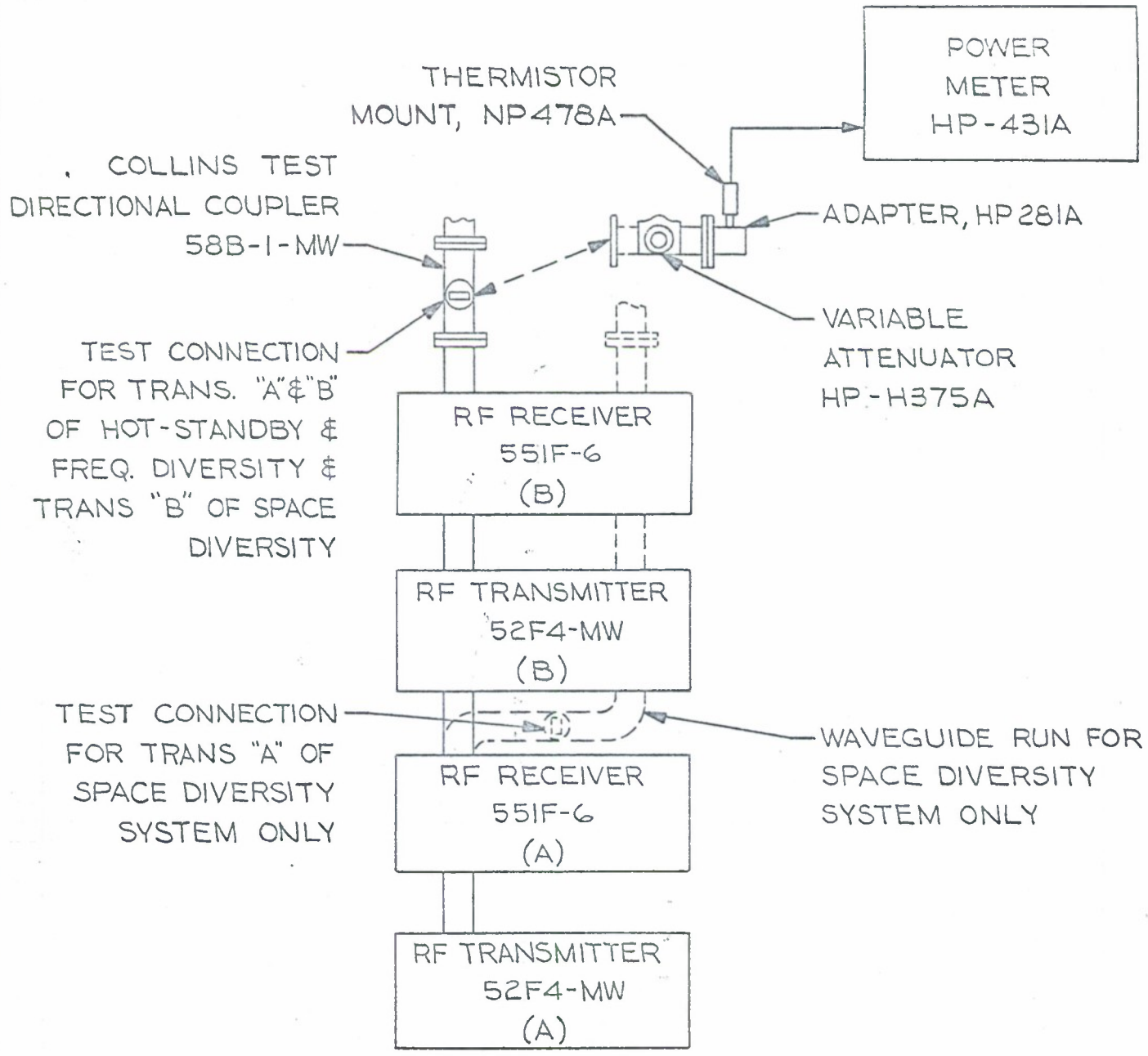

FIGURE-1

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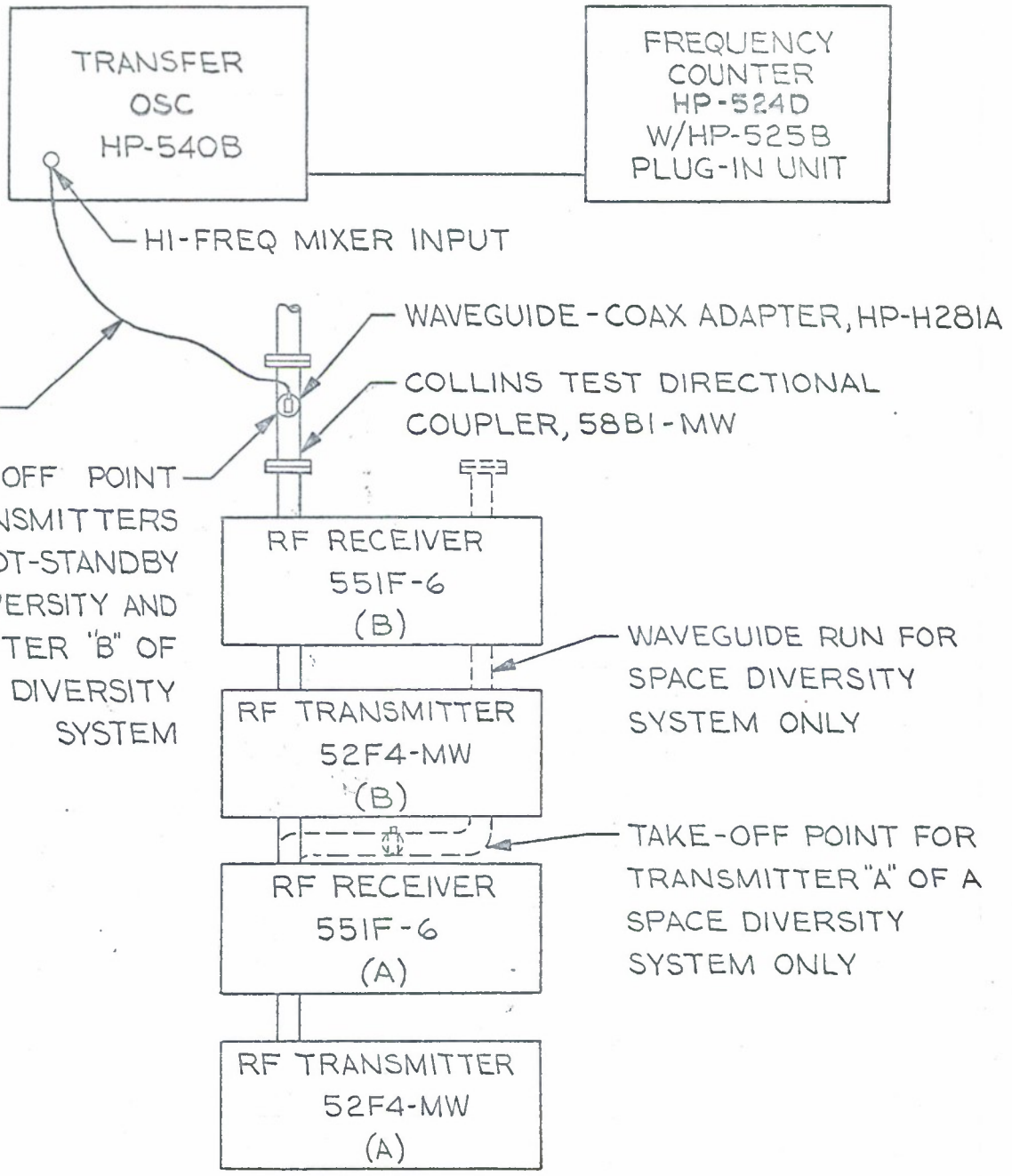

FIGURE - 2

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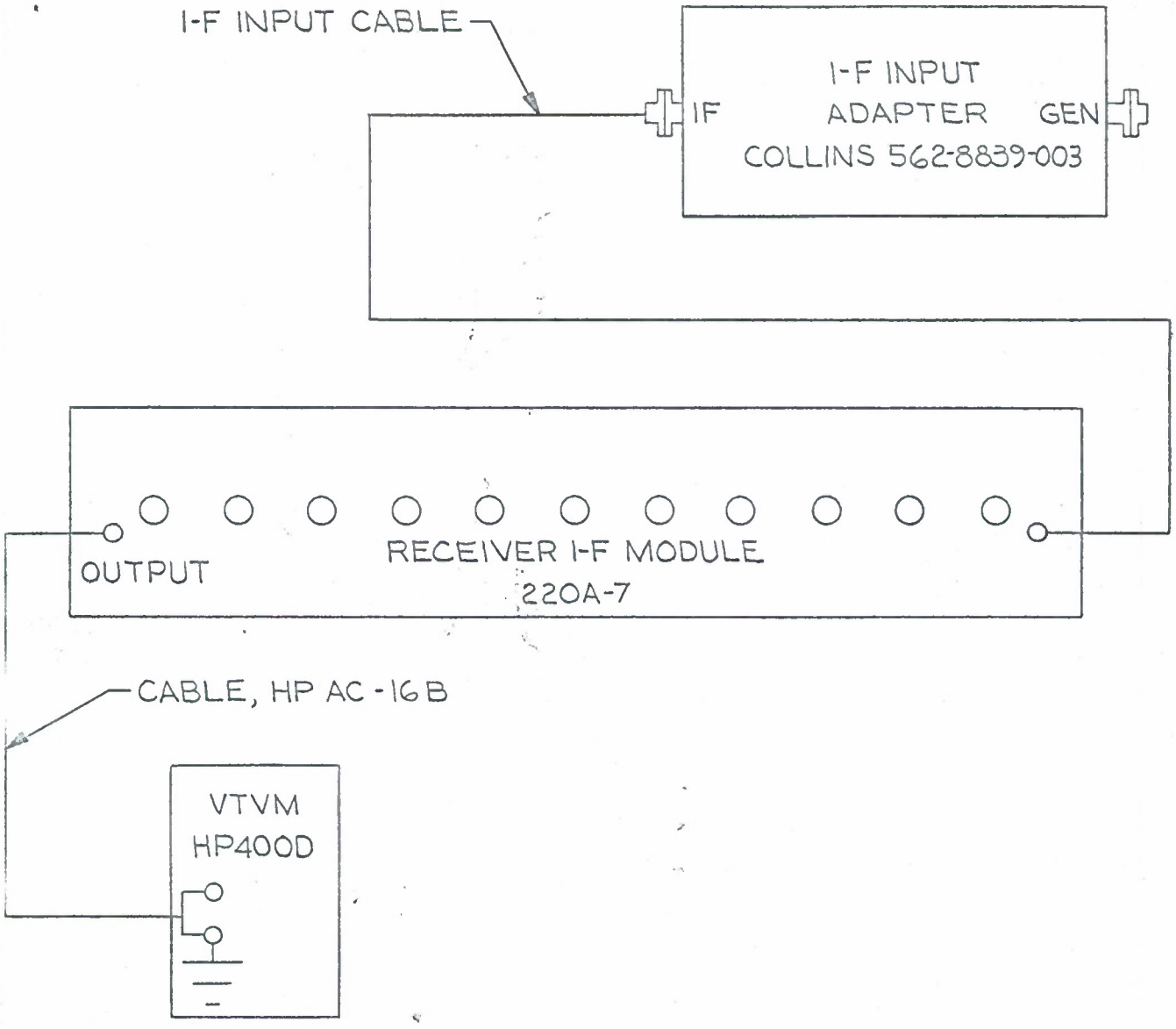

FIGURE - 3

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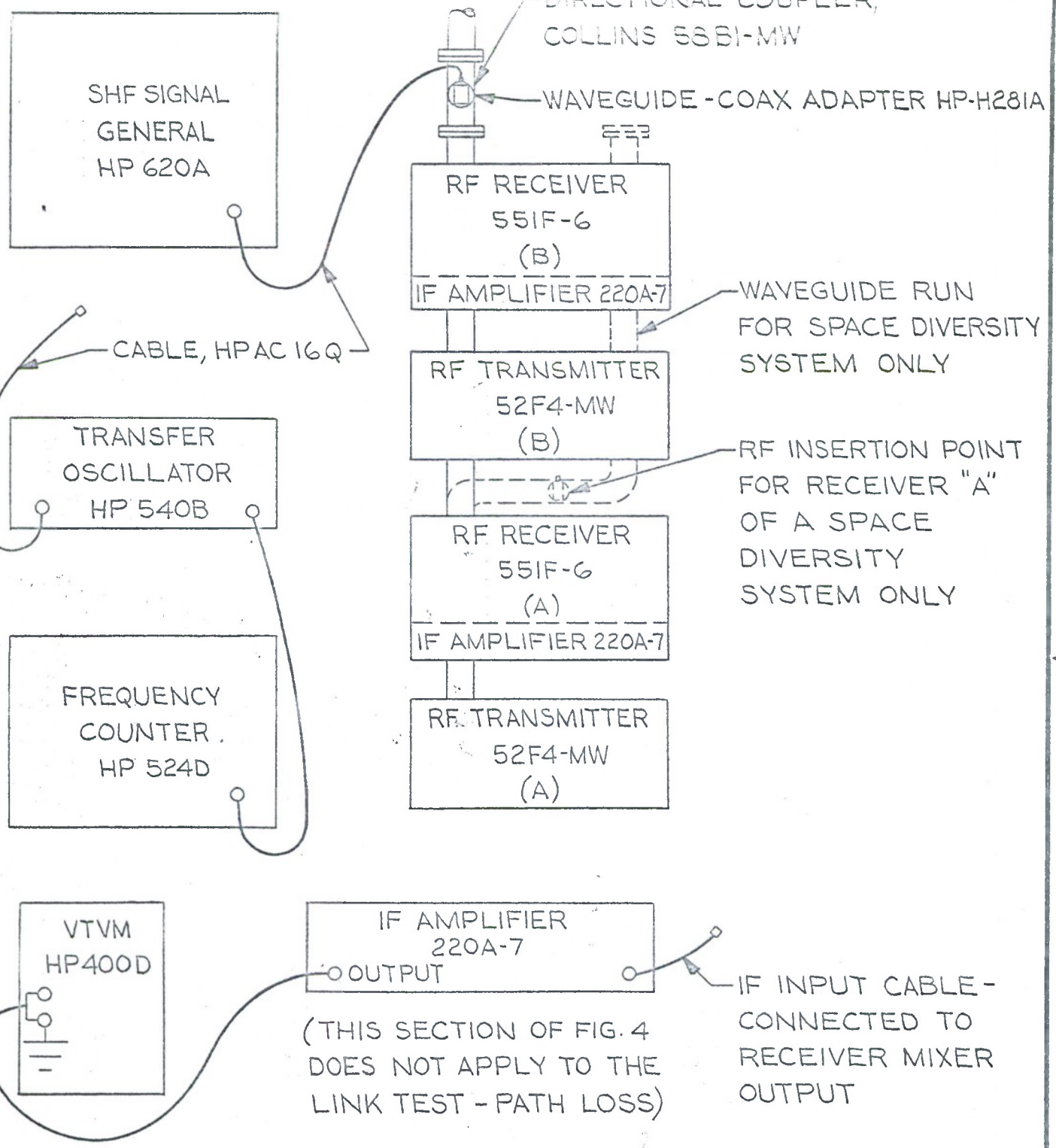

FIGURE-4

PREPARED BY J. A. LIPARI 3-11-64	CODE IDENT. NO. 14842	DWG. A SIZE	6272876 A
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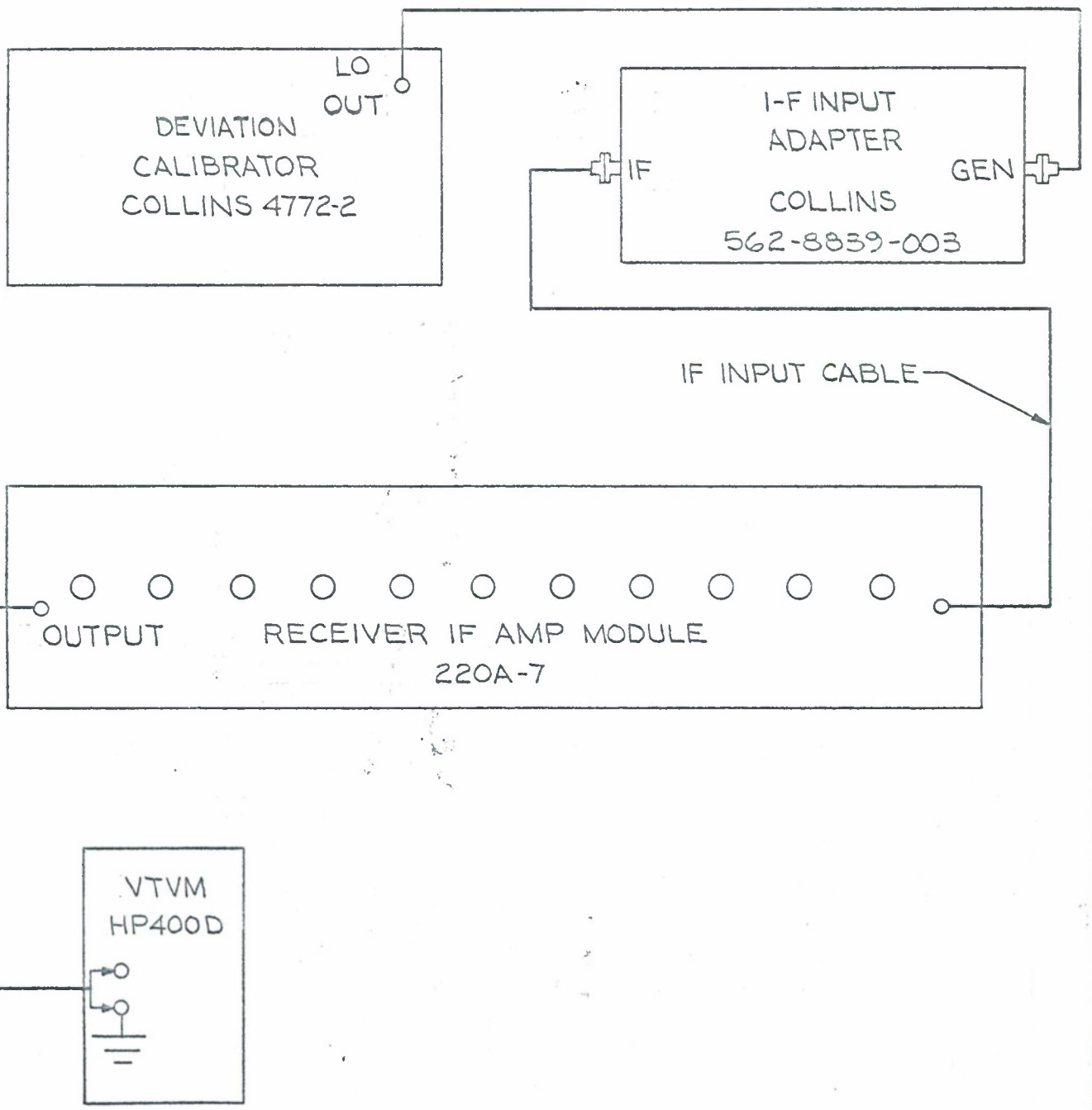

FIGURE-5

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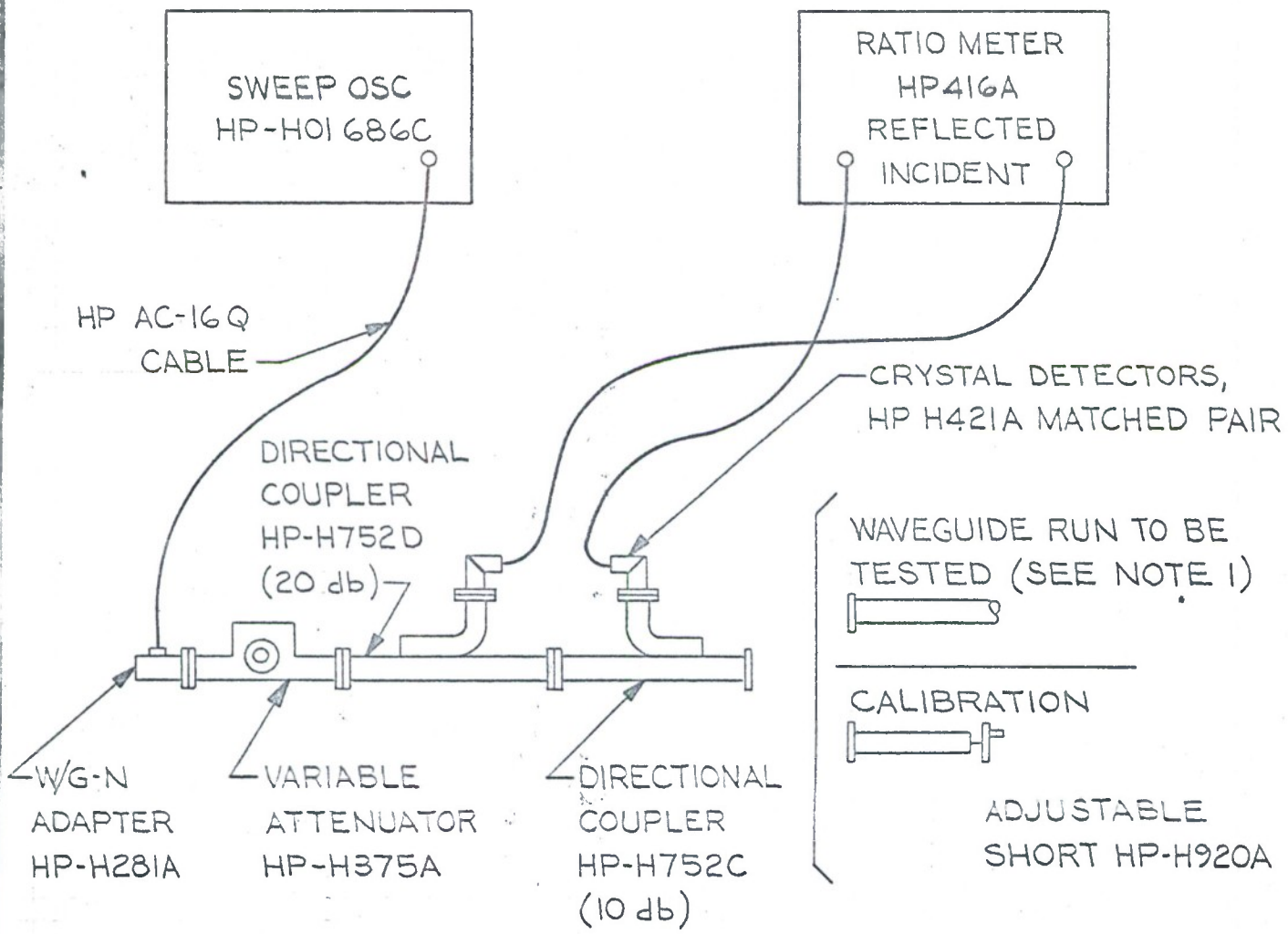

NOTE:

1. BE CERTAIN THAT THE WAVEGUIDE IS ADEQUATELY SUPPORTED DURING THE VSWR TESTS

FIGURE -6

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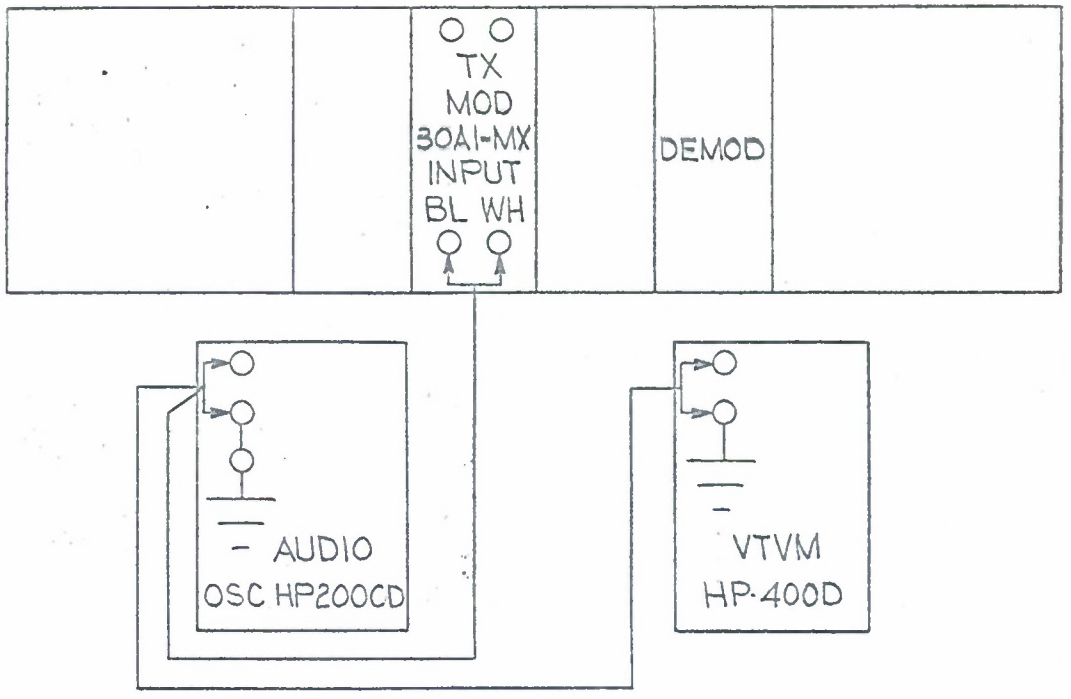
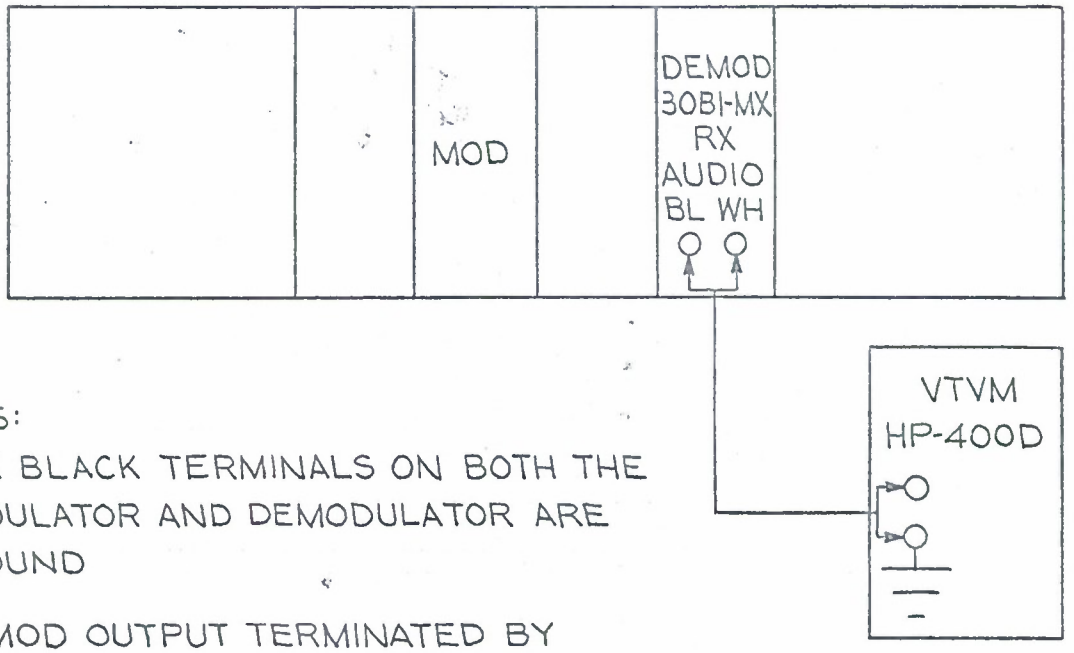
TRANSMITTING STATION
ORDER WIRE SHELF



RECEIVING STATION
ORDER WIRE SHELF



NOTES:

1. THE BLACK TERMINALS ON BOTH THE MODULATOR AND DEMODULATOR ARE GROUND
2. DEMOD OUTPUT TERMINATED BY ITTK OW EQUIP.

FIGURE-7

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TRANSMITTING STATION

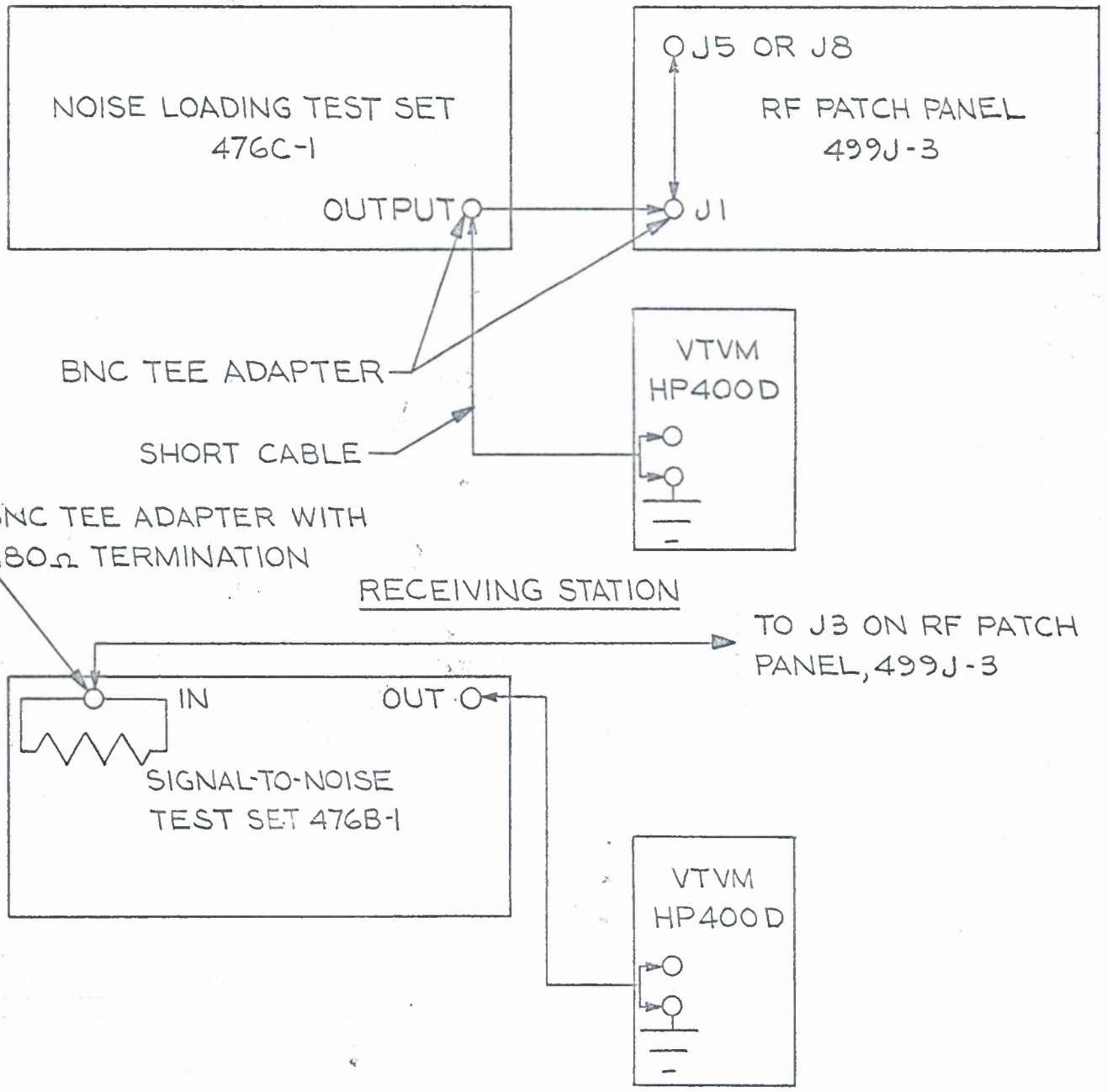

FIGURE-8

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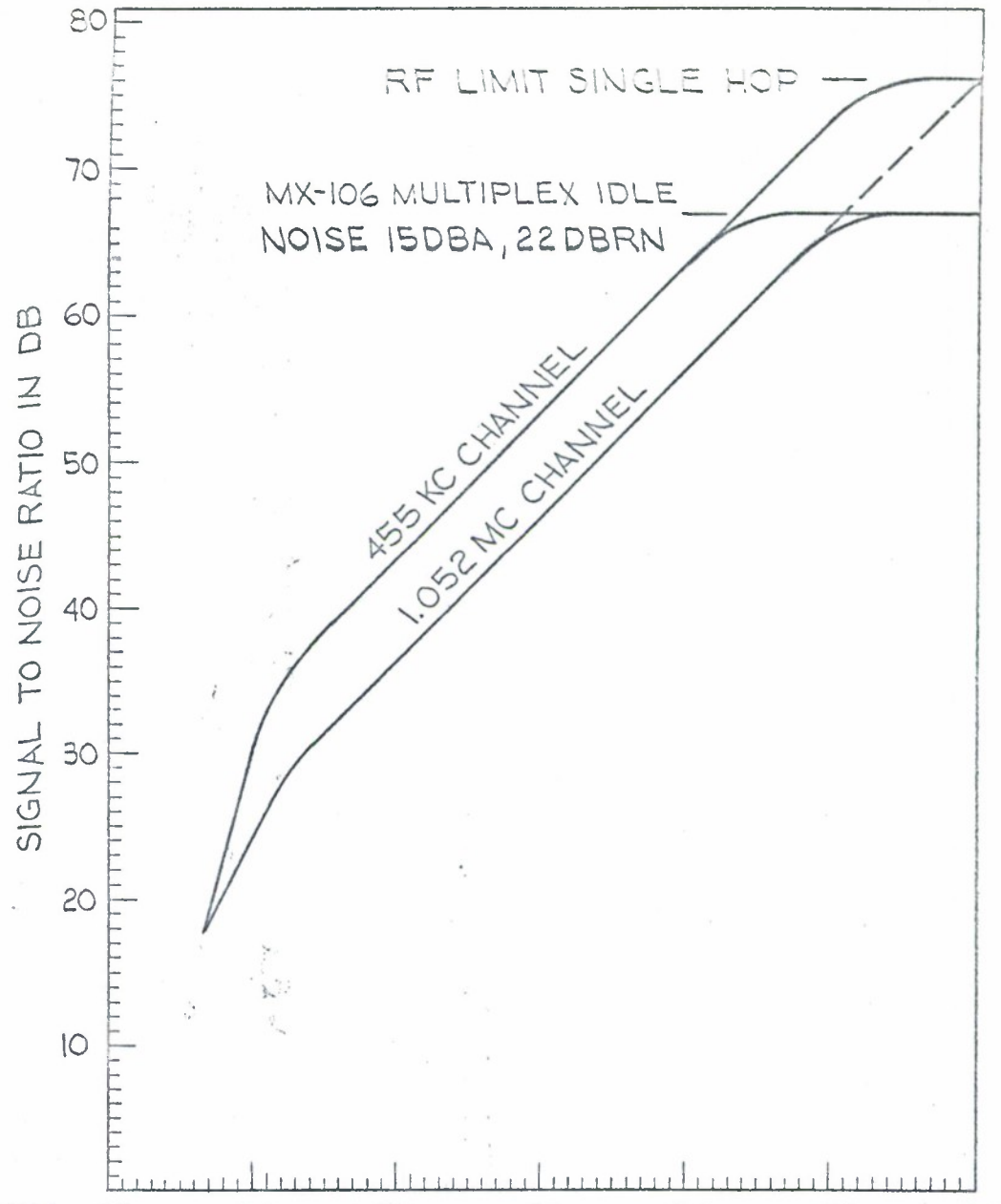

FIGURE 9

SIGNAL TO NOISE RATIO VS RECEIVED SIGNAL POWER

NOTES:

1. RECEIVED POWER IN DBM IS OBTAINED IN STEP G OF THE NPL MEASUREMENT (SECTION 11.6) OF THIS PROCEDURE AND RECORDED ON DATA SHEET BR11/85, ITEM 6
2. THE 455 KC CHANNEL IS USED IN THIS TEST
3. RF LIMIT SINGLE HOP IS THE S/N LIMIT OF THIS MEASUREMENT

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SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR																									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A						✓					

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TEST PROCEDURES
RADIO SET AN/TRC-35
BIG RALLY II COMMUNICATION SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272877
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DRAWING NUMBER 6272877

1. SCOPE

1.1 This test plan outlines the testing procedures for the AN/TRC-35 Radio Set.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The Radio Set must be properly installed and have been placed into operation prior to the performance of the test procedure in accordance with manufacturer's manual.

3.2 Tests will be performed on equipment properly installed with all signal power connections complete.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 Transmitter, T-302/TRC(TRC-35)

5.1.1 Frequency

5.1.2 Power Output

5.1.3 Automatic Frequency Control

5.1.4 Low Power Alarm

5.2 Receiver, R-417/TRC (TRC-35)

5.2.1 Bandwidth

5.2.2 Squelch Sensitivity

5.3 Overall Tests, AN/TRC-35

5.3.1 Deviation & Baseband Gain

5.3.2 Radio Baseband Frequency Response

5.3.3 Antenna VSWR

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Test Procedures Radio Set AN/TRC-35	CODE IDENT. NO. 14842	DWG. SIZE A	6272877
PREPARED BY [signature] DATE 3/29/64			
CHECKED BY [signature] DATE 4/3/64		FEC NO.	SHEET 2

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5.4 Link Tests, AN/TRC-35

5.4.1 Radio Noise and Spurious Tones

5.4.2 Baseband Frequency Response

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. TRANSMITTER, T-302/TRC(Form BRII/31)

7.1 All tests in this section will be performed on both transmitters.

7.2 Frequency

7.2.1 Test Equipment

A. Frequency Counter, HP524B

B. Wattmeter, ME-82/U

7.2.2 Procedure

A. Load the transmitter T-302 into the wattmeter.

B. Insert a TEE connector in the line between the exciter and the wattmeter so that some of the power can be coupled off the line inductively.

C. Connect the frequency counter to the RF line through the inductive couple.

D. Record the frequency of the exciter as indicated on the counter.

E. Repeat steps A through D for the second transmitter.

7.3 RF Power Output

7.3.1 Test Equipment

A. Wattmeter, ME 82/U

7.3.2 Procedure

A. Connect the wattmeter to the transmitter T302 antenna jack.

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B. Read and record the indicated power on the wattmeter.

7.4 Automatic Frequency Control

7.4.1 Test equipment not required.

7.4.2 Procedure

A. Rotate AFC control to the +5 position. The FREQ DRIFT meter deflection should be upscale. Release the AFC control. FREQ DRIFT meter indication should return to 0 ±2 ua.

B. Rotate the AFC control to the -5 position. The FREQ DRIFT meter deflection should be downscale. Release the AFC control, FREQ DRIFT meter indication should return to 0 ±2ua. Initial data sheet.

7.5 Low Power Alarm

7.5.1 Test equipment not required.

7.5.2 Procedure

A. Turn the ALARM switch to the NOR position.

B. Turn the 750V ADJ switch for rf output power levels from 70 watts to approximately 30 watts. The alarm should remain silent.

C. Rotate the 750V ADJ switch for rf output power levels below 30 watts. The LOW PWR ALARM lamps should glow and the buzzer should sound.

D. Record level at which low power alarm operates.

8. RECEIVER, R-417/TRC-35) (Form BRII/32)

8.1 Bandwidth

8.1.1 Test Equipment

A. Signal Generator, USM-16

B. Attenuator, variable, Kay 30-0

8.1.2 Procedure

A. Connect the equipment as shown in Fig. 1A.

Test Procedures Radio Set AN/TRC-35	CODE IDENT. NO.	DWG.	
PREPARED BY F. [illegible] DATE 3/29/64	14842	A SIZE	6272877
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B. Set attenuator between 5 and 10 db. Record MEASURE meter reading.

C. Increase the signal by 3 db at the attenuator and record MEASURE meter reading.

D. Decrease the signal frequency until the MEASURE meter indicates the reading in Step B. Record frequency as read on the frequency counter.

E. Tune the signal generator to the other side of the center frequency to obtain the same output reading on the MEASURE meter and record the counter reading.

F. Repeat steps A through E for receiver #2.

8.2 Squelch Sensitivity

8.2.1 Test Equipment

A. Signal Generator, USM-16

8.2.2 Procedure

A. Remove the band pass filter of the receiver to be tested and install the dummy filter in its place.

B. Connect the output of the signal generator to the ANT jack of the receiver.

C. Set receiver MEASURE switch to B+ position and record the meter reading.

D. Set receiver MEASURE switch to SIG LEV.

E. Set ACF-OFF-CAL switch to OFF.

F. Adjust tuner AFC control to 0 and set RF AMP to the station receive frequency channel.

G. Adjust frequency of signal generator to the frequency of the receiver tuner. Adjust the signal output voltage to about six microvolts.

H. Fine tune the receiver for indication of maximum on the MEASURE meter and 0 on the FREQ DRIFT meter. Record MEASURE meter reading.

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Test Procedures Radio Set AN/TRC - 35	CODE IDENT. NO. 14842	DWG. SIZE A	6272877
PREPARED BY P. Jones DATE 3/29/64			
CHECKED BY DR DATE 4/17/64		FEC NO.	SHEET 5

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I. Rotate receiver SQUELCH control to maximum clockwise position.

J. Adjust signal generator output to 250 microvolts. Do not change frequency.

K. Rotate receiver SQUELCH control to maximum counter-clockwise position. Adjust generator output until receiver becomes squelched. Record generator output level at which the receiver becomes squelched.

L. Reset squelch control to normal position.

M. Repeat steps A through L for receiver #2.

9. OVERALL TESTS AN/TRC-35 (Form BRII/33)

9.1 Deviation and Baseband Gain

9.1.1 Test Equipment

A. Signal Generator, USM-16

B. AC-VTVM, HP-400D

C. Attenuator, KAY 30-0

D. Voltmeter, Sierra 125B

E. Oscillator, HP-200 CD

F. Matching Transformer, HP AC-60B

G 600 Ohm Resistor

9.1.2 Procedure

A. Tune the receiver to the station transmit frequency.

B. Connect the signal generator to the receiver antenna jack.

C. Adjust generator to the station transmit frequency at a signal level of 15,000 microvolts.

D. Terminate the REC jacks on the front panel of the receiver with a 600 ohm resistor.

E. Record the MEASURE meter reading with the MEASURE switch in the SIG LEV position.

F. Connect the HP200CD oscillator to the EXT. MOD. jack of the signal generator to provide external modulation of the R.F. signal.

G. Set the oscillator to a frequency of 20 KC.

H. Set the frequency deviation control on the USM-16 to mid-range and then increase the oscillator output to obtain an indicated deviation of 62 KC.

I. With a balanced 600 ohm voltmeter, measure and record the voltage across the resistor at the output of the receiver. The output level should be -6 dbm after adjustment of the receiver output control.

J. Without changing control settings on the receiver, connect test equipment as shown in figure 2.

K. Load the transmitter into the dummy load.

L. Adjust Kay attenuator so that the signal level indicated on the receiver MEASURE meter is the same as in step E. Record level.

M. Adjust oscillator to a frequency of 20,000 cps. Adjust signal level to provide a 0 dbm input at the XMTG jacks on the front panel of the receiver. (Allow approximately 0.5 db loss through the transformer).

N. With a balanced 600 ohm voltmeter, measure and record the voltage across the resistor at the output of the receiver.

O. Repeat steps A through L using transmitter #2 and receiver #2.

9.2 Baseband Frequency Response

9.2.1 Test Equipment

A. AC-VTVM, HP 400D

B. Frequency Selective Voltmeter, Sierra 125B

C. Audio Oscillator, HP 200 CD

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D. Isolation Transformer, HP AC-60A

E. 600 Ohm Resistor

F. Attenuator, Adjustable, KAY 30-0.

9.2.2 Procedure

A. Connect the test equipment as shown in Figure 3 using Transmitter and Receiver #1.

B. R.F. energy is coupled into the receiver pick-up cable by loose inductive coupling. A short section of wire wrapped around the N type "Tee" connector should be sufficient.

C. Adjust the KAY attenuator in the receiver R. F. patch for maximum attenuation.

D. Load the transmitter into the dummy load.

E. Tune the receiver to the transmitter frequency.

F. Adjust the KAY attenuator to obtain approximately 30 MV of 1st Limiter voltage on the receiver Measure meter.

G. Vary the 200 CD oscillator from 8 kc to 90 kc as indicated on the data sheet while keeping the oscillator output constant at 0 dbm as monitored on the 400 D VTVM.

H. Record the Sierra 125B Voltmeter readings on the data sheet.

I. Repeat sections B through H using Transmitter and Receiver #2.

9.3 Antenna VSWR Measurements

9.3.1 Test equipment not required.

9.3.2 The VSWR of the AN/TRC-35 antenna system is calculated from the forward and reflected current readings as read on test meter M102.

9.3.3 Procedure

A. Ensure that the transmitter is correctly tuned and loaded.

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B. Place S104 in the FWD PWR position and read, on M102, the forward antenna current.

C. Place S104 in the REFL PWR position and read, on M102, the reflected antenna current.

D. Record the FWD and REFL antenna currents for the transmit antenna on the data sheet.

E. Reverse the antenna connections at the equipment, i. e. connect the receive antenna to the transmitter and repeat steps A through C.

F. Record the receive antenna FWD and REFL antenna current on the datasheet.

10. LINK TESTS AN/TRC-35 (Form BRII/34)

10.1 Radio Noise and Spurious Tones

10.1.1 Test Equipment

A. Voltmeter, Sierra 125B

10.1.2 Procedure

A. Disconnect the multiplex equipment from the receiver by removing the interconnecting cables from the XMTG and REC jacks on the front panel of the receiver.

B. Terminate the receiver with a 135 ohm resistor.

C. Connect the voltmeter to the balanced 135 ohm REC jacks.

D. While receiving an RF signal from the adjacent station, scan the 12 to 68 KC baseband with the voltmeter.

E. Record all noise and spurious tones above -55 dbm.

F. Repeat steps A through D using the alternate radio system.

10.2 Link Radio Baseband Frequency Response

10.2.1 Test Equipment

A. AC-VTVM, HP-400D

B. Frequency Selective Voltmeter, Sierra 125B

C. Audio Oscillator, HP 200 CD

D. Isolation Transformer, HP AC-60A

E. 600 OHM Resistor

10.2.2 Procedure

A. The station transmitting the baseband test signals is designated Station A and the receiver station is designated Station B.

B. Connect the test equipment for both Station A and B as shown in Figure 4.

C. Only one Station A transmitter and one Station B receiver need be checked in the link test. Be certain that the radio equipment used is properly tuned for normal station operation.

D. At Station A, vary the 200 CD oscillator from 8 kc to 90 kc as indicated on the data sheet while keeping the oscillator output constant at 0 dbm as monitored on the 400D VTVM.

E. At Station B, record the Sierra 125B voltmeter readings on the Link Test data sheet.

F. The two stations in the link should now reverse their roles of transmitting and receiving of the baseband test signals and repeat sections A through E of this procedure.

G. Return the equipment to normal operation.

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DRAWING NUMBER 6272877 11

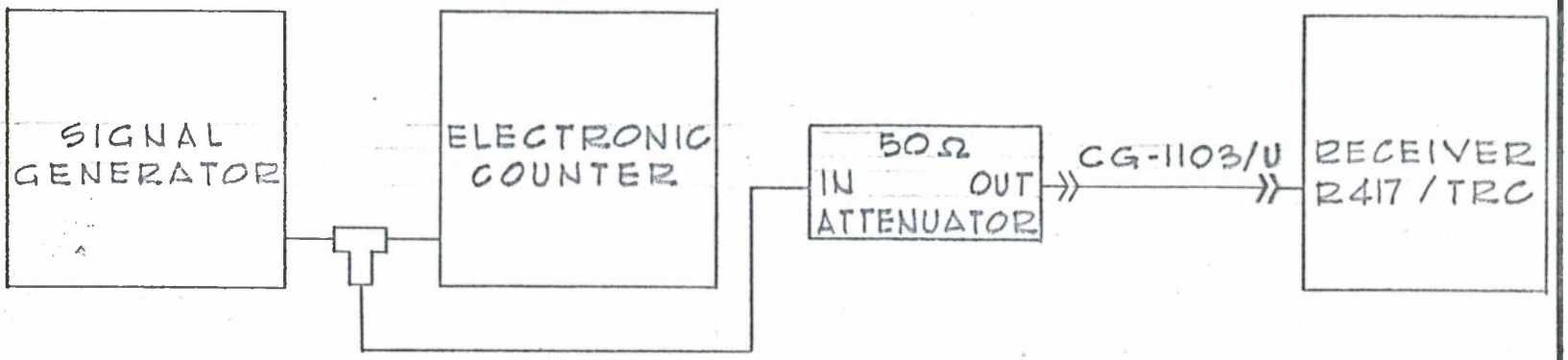
PREPARED BY F. BECK DATE 3-10-64
CHECKED BY DATE 3/12/64

CODE IDENT. NO. 14842 DWG. SIZE A

FEC NO. 6272877 A

SHEET 11

(a)



(b)

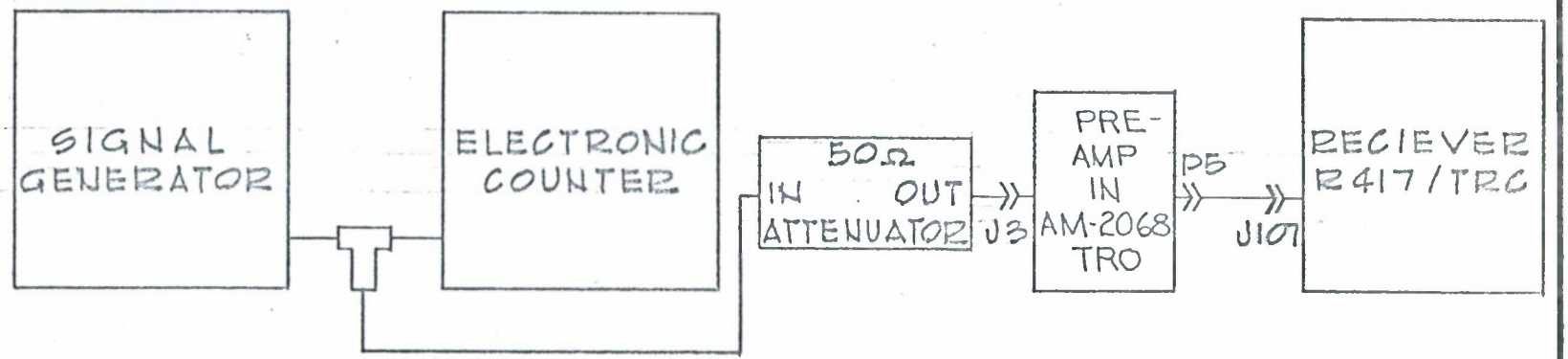


FIGURE 1

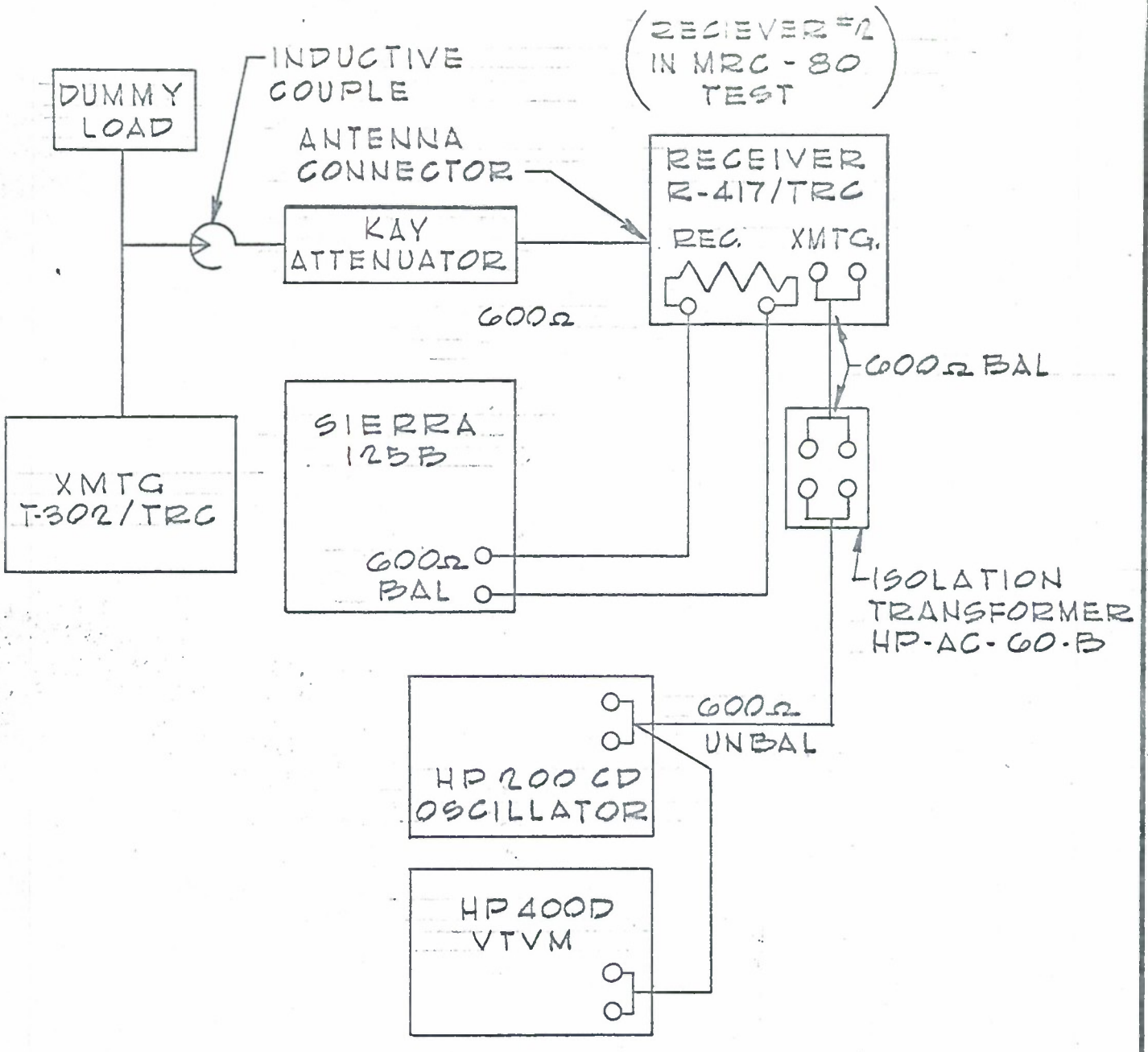


FIGURE-2

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DRAWING NUMBER 6272877 12

F. BECK 3.10.64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272877 A
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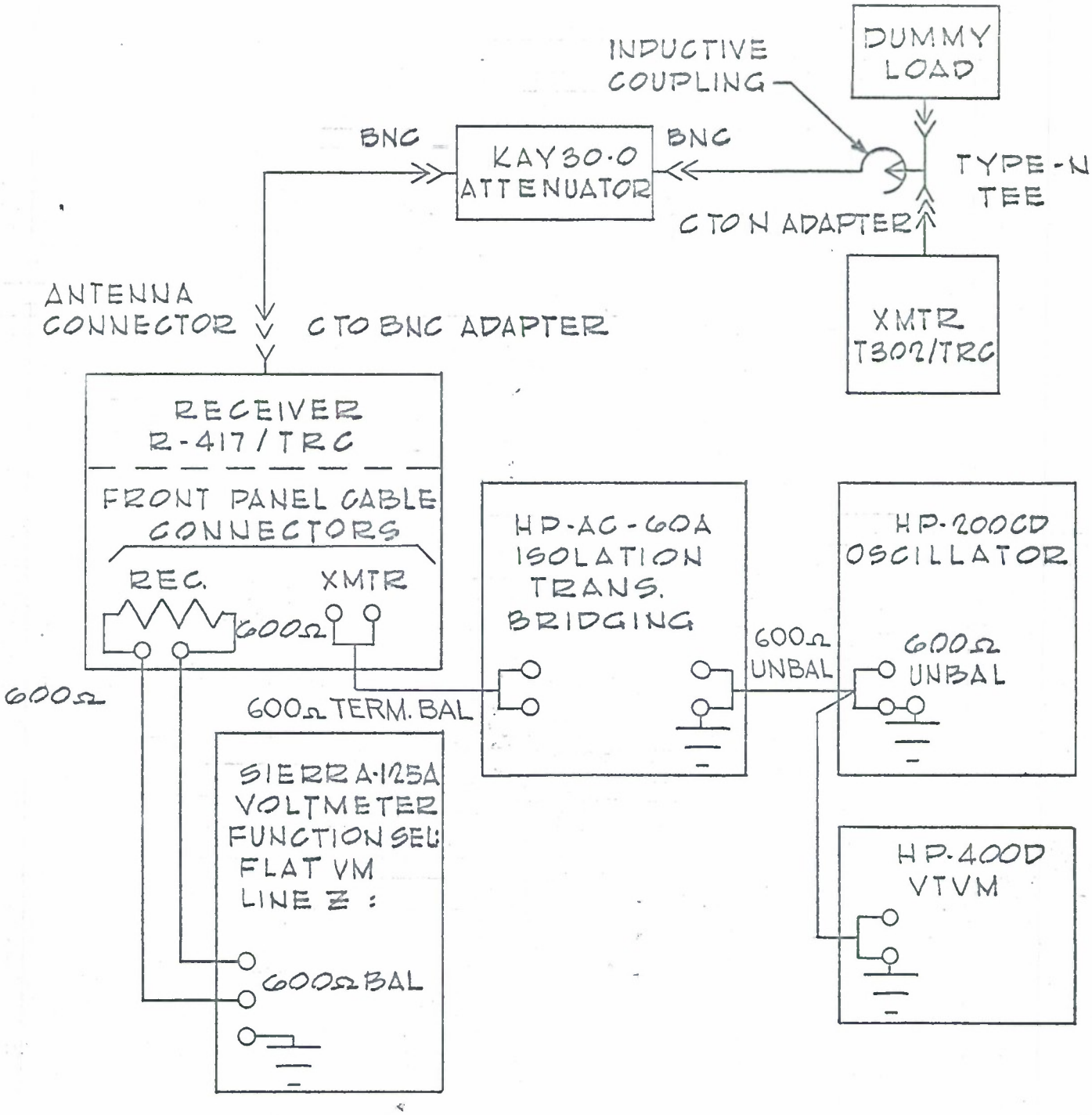

FIGURE 3

F. BECK 3-10-64 PREPARED BY / DATE	CODE IDENT. NO. 14842	DWG SIZE A	6272877 A
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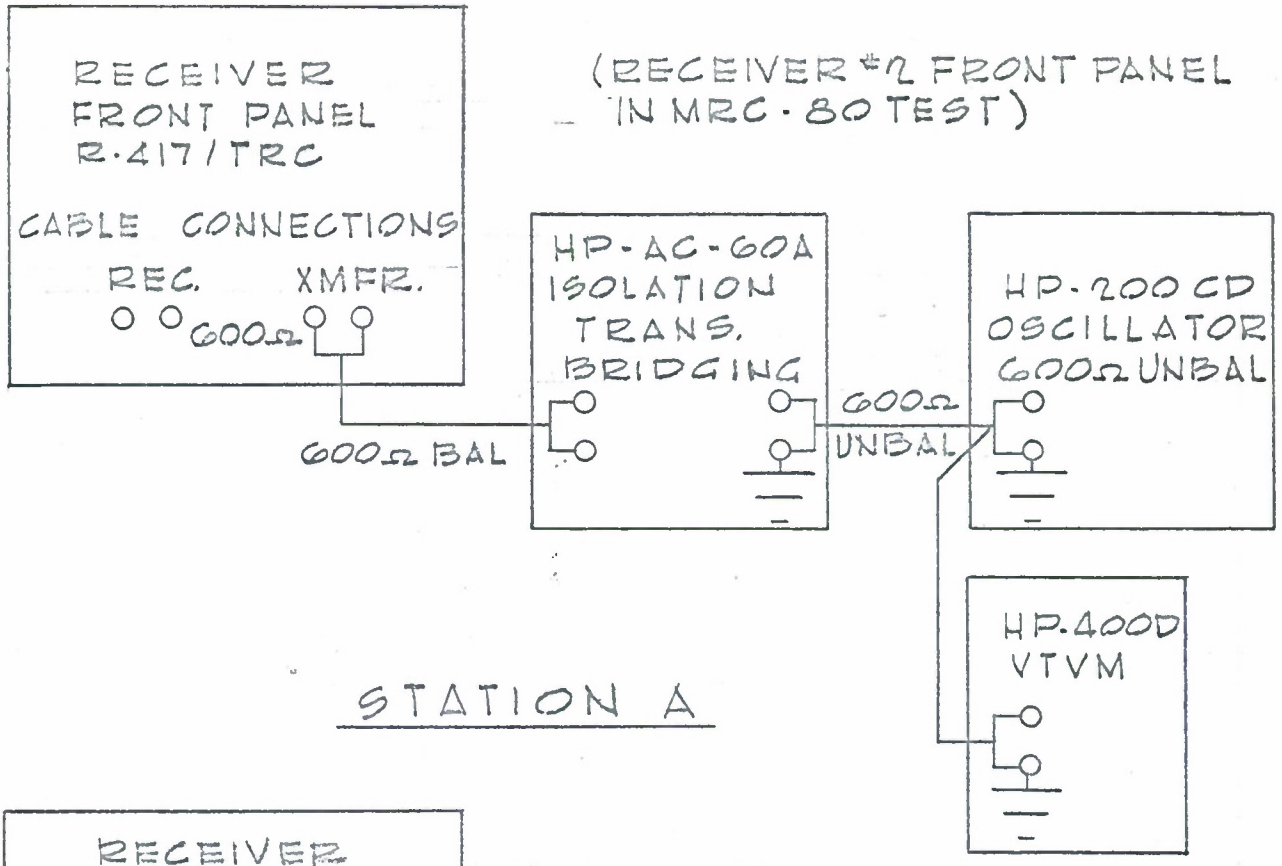
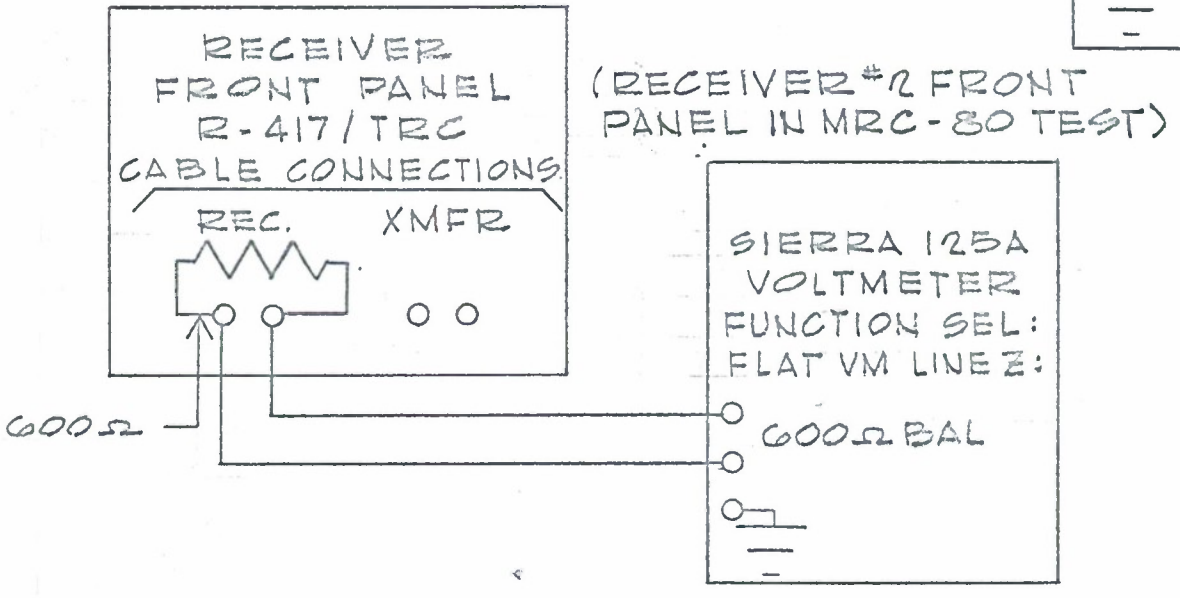


STATION A



STATION B

FIGURE 4

F. BECK 3-10-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272877 A
PREPARED BY DATE			
CHECKED BY DATE		FEC NO.	SHEET 14

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

FEE-2A (P)

NO 6272878

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVED
A		ORIGINAL ISSUE		

SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR																									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		

GROUP		NEXT ASSEMBLY	FIRST USED ON
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		APPLICATION	

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DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

COML. TOL. APPLY TO STOCK SIZES

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TEST PROCEDURES
RADIO SET AN/MRC - 80
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG. SIZE	
14842	A	6272878
SCALE	FEC NO.	SHEET 1 OF 22

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

1. SCOPE

1.1 This section outlines the testing procedures for the AN/MRC-80 Radio Set.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The Radio Set must be properly installed and have been placed into operation prior to the performance of the test procedure in accordance with manufacturer's manual.

3.2 Tests will be performed on equipment properly installed with all signal power connections complete.

4. PROCEDURE

4.1 The procedure for performing each test is included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 Transmitter, T-302/TRC (MRC-80)

5.1.1 Frequency

5.1.2 Power Output

5.1.3 Automatic Frequency Control

5.1.4 Low Power Alarm

5.2 Amplifier Power Supply, AM2066/TRC(MRC-80)

5.2.1 Input Power

5.2.2 Output Power and Gain

5.2.3 Reflected Power and VSWR

5.2.4 Low Power Alarm

5.3 Receiver, R-417/TRC with Selector SA-607/TRC(MRC-80)

5.3.1 Bandwidth

Testing Procedures Radio Set AN/MRC - 80	CODE IDENT. NO. 14842	DWG. SIZE A	6272878
PREPARED BY [illegible] DATE 3/29/64			
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5.3.2 Quieting Sensitivity

5.3.3 Combining Action

5.3.4 Receive Antenna VSWR

5.4 Overall Tests, AN/MRC-80

5.4.1 Deviation & Baseband Gain

5.4.2 Radio Baseband Frequency Response

5.5 Link Tests, AN/MRC-80

5.5.1 Radio Noise and Spurious Tone Levels

5.5.2 Baseband Frequency Response

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. TRANSMITTER, T-302/TRC(MRC-80) Form BRII/21

7.1 Frequency

7.1.1 Test Equipment

A. Frequency Counter, HP 524D

B. Wattmeter, ME-82/U

7.1.2 Procedure

A. Load the exciter T-302 into the wattmeter.

B. Insert a TEE connector in the line between the exciter and wattmeter so that some of the power can be coupled off the line inductively.

C. Connect the frequency counter to the RF line through the inductive couple.

D. Record the frequency of the exciter as indicated on the counter.

E. Repeat steps A through D for the second exciter.

Testing Procedures Radio Set AN/MRC - 80	CODE IDENT. NO. 14842	DWG. SIZE A	6272878	A
PREPARED BY [signature] DATE 3/29/64				
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 3	

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7.2 RF Power Output

7.2.1 Test Equipment

A. Wattmeter, ME-82/U

7.2.2 Procedure

A. Connect the wattmeter to the exciter T-302 antenna jack.

B. Read and record the indicated power on the wattmeter.

7.3 Automatic Frequency Control

7.3.1 Test equipment not required

7.3.2 Procedure

A. Rotate AFC control to the +5 position. The FREQ DRIFT meter deflection should be upscale. Release the AFC control. FREQ DRIFT meter indication should return to 0±2ua.

B. Rotate the AFC control to the +5 position. The FREQ DRIFT meter deflection should be downscale. Release the AFC control. FREQ DRIFT meter indication should return to 0±2ua. Initial data sheet.

7.4 Low Power Alarm

7.4.1 Test Equipment not required.

7.4.2 Procedure

A. Turn the ALARM switch to the NOR position.

B. Turn the 750 V ADJ switch for rf output power levels from 70 watts to approximately 30 watts. The alarm should remain silent.

C. Rotate the 750 V ADJ switch for rf output power levels below 30 watts. The LOW PWR ALARM lamps should glow and the buzzer should sound. Record level.

8. AMPLIFIER POWER SUPPLY AM2066/TRC (Form BRII/22)

8.1 Input Power

8.1.1 Test equipment not required

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8.1.2 Input power will be the output power of the exciter T-302, recorded in paragraph 7.2, minus the power loss in the cable run between the exciter and the power amplifier AM2066/TRC. The cable loss at this frequency is approximately 0.05 db per foot. Record the input power to the power amplifier on the data sheet.

8.2. Output Power and Gain

8.2.1 Test equipment not required.

8.2.2 Procedure

A. Read and record output power level on FORWARD POWER meter M104.

B. Record power gain which should be at least 10 db.

NOTE: Power values referred to above are the net values i.e., power in the forward direction, minus the reflected power.

8.3 Reflected Power and VSWR

8.3.1 Test Equipment not required.

8.3.2 Read and record Reflected Power meter M105.

8.3.3 VSWR Calculation.

A. Calculation of VSWR from a ratio of forward and reflected power can be made by using the following formula:

$$\text{VSWR} \quad \frac{\sqrt{P_f/P_r} + 1}{\sqrt{P_f/P_r} - 1}$$

where, P_f = Forward power in watts

P_r = Reflected power in watts

B. Using the power readings obtained in sections 8.2.2 and 8.2.3 above, record the VSWR as determined from Table I on Page 6. It is required that VSWR be recorded to three significant figures. Therefore, the power ratio which is calculated should be equated to the nearest power ratio shown on the chart. This will give the required VSWR figure.

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8.4 Low Power Alarm

8.4.1 Test equipment not required

8.4.2 Procedure

A. Adjust drive power to obtain full power output as indicated on FORWARD POWER meter.

B. Decrease drive power until the low power alarm sounds.

C. Record difference in output power between Step A and Step B.

9. RECEIVER, R-417/TRC WITH SELECTOR SA-607/TRC(MRC-80)(FORM BRII/23

9.1 Combiner Action

9.1.1 Test Equipment

A. 2-Audio Oscillators, HP 200DC or equivalent

B. Voltmeter, HP 400H

C. Oscilloscope, Tektronix 317 or equivalent

D. Attenuator, Kay Electric 30-0

E. Multimeter, Simpson 270

9.1.2 Gain and Combiner Action Test

A. Connect test equipment to the selector as shown in Figure 6, sk. 1

B. The total hum and noise at output A1 should be no more than 6 mv with no input signal

C. Adjust the audio oscillator for a 10 KC, 50 mv input at B1

D. The output measured at A1 should be 50 mv $\pm$ 0.5 db

E. Increase the input at B1 from 50 mv to 500 mv

F. The oscilloscope at A1 should show a clear, undistorted, 10 KC sine wave

G. Connect the test equipment to the selector as shown in Figure 6, sk. 2

H. Adjust audio oscillator #1 for a 50 mv input at C2 at approximately 10 KC

I. Adjust audio oscillator #2 for a 40 mv input at B1 at approximately 87 KC

J. The output at A1 should be 50 mv $\pm$ 0.5 db

K. Set Switch S2001 to NC2 position

L. The microammeter should read -16 $\pm$ 1ua

M. Decrease the output of audio oscillator #2 until the microammeter reads -8ua

N. The output at A1 should remain at 50 mv $\pm$ 0.50 db

O. Increase the amplitude of audio oscillator #1 to 500 mv at C2 (about 10 times)

P. The oscilloscope at A1 should show a clear, undistorted, 10 KC sine wave when the output of audio oscillator #2 is adjusted for -8 and -16 ua on the microammeter.

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A SERVICE

Test Procedures Radio Set AN/MRC - 80 PREPARED BY [signature] DATE 3/2/64 CHECKED BY [signature] DATE 4/2/64	CODE IDENT. NO. 14842	DWG. SIZE A	6272878
		FEC NO.	SHEET 7

GILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

CONVERSION TABLE I
POWER RATIO TO VSWR

P_I/P_r	VSWR	P_I/P_r	VSWR	P_I/P_r	VSWR	P_I/P_r	VSWR	P_I/P_r	VSWR
39601	1.01	367	1.11	110	1.21	56	1.31	34	1.41
	1.02	312	1.12	102	1.22	53	1.32	33	1.42
4624	1.03	268	1.13	94	1.23	50	1.33	32	1.43
2601	1.04	233	1.14	87	1.24	47	1.34	31	1.44
1681	1.05	205	1.15	81	1.25	45	1.35	30	1.45
1183	1.06	182	1.16	75	1.26	43	1.36	29	1.46
876	1.07	162	1.17	70	1.27	41	1.37	28	1.47
676	1.08	146	1.18	66	1.28	39	1.38	27	1.48
538	1.09	132	1.19	62	1.29	37	1.39	26	1.49
441	1.10	121	1.20	59	1.30	36	1.40	25	1.50

Example:

If forward power is 1 KW and reflected power is 12.5 watts, then the power ratio is $P_I/P_r = \frac{1,000}{12.5} = 80$. Converting this ratio to the nearest ratio on the chart shows that the VSWR is approximately 1.25. Since the VSWR is required to three significant figures, the value of 1.25 should be used for a ratio of 80.

Test Procedures Radio Set AN/MRC - 80	CODE IDENT. NO. 14842	DWG. SIZE A	6272878
PREPARED BY F. Hines DATE 3/29/64			
CHECKED BY DL DATE 4/7/64		FEC NO.	SHEET 8

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Q. Repeat steps G through P for channel No. 2 reversing the audio oscillators and setting switch S2001 to the NC1 position.

9.2 Quieting Sensitivity

9.2.1 Test Equipment

A. Signal Generator, USM-16

B. Voltmeter, AC VTVM, HP400D

9.2.2 Procedure

A. Connect the signal generator to ANT jack of receiver No. 1 and the VTVM to jack C1

B. Adjust frequency of signal generator to the receiver frequency.

C. Adjust output of signal generator to obtain 20 db of quieting on the VTVM.

D. Record output level of signal generator.

E. Connect the signal generator to ANT jack of receiver No. 2 and the VTVM to jack B.

F. Repeat steps B, C and D on receiver No. 2.

9.3 Bandwidth

9.3.1. Test Equipment

A. Signal Generator, USM-16.

B. Attenuator, variable, Kay 30-0.

9.3.2 Procedure

A. Connect equipment as shown in Figure 1B.

B. Terminate output of Receiver No. 2 with a 600 ohm resistor.

C. Set attenuator between 5 and 10 db. Record MEASURE meter reading.

D. Increase the signal by 3 db at the attenuator.

E. Decrease the signal frequency until the MEASURE meter indicates the reading in Step C. Record frequency as read on the frequency counter.

F. Tune the signal generator to the other side of the center frequency to obtain the same output reading on the MEASURE meter as Step C and record the counter reading.

G. Repeat steps A through F on both receivers.

9.4 VSWR Measurements Receive Antenna MRC-80 (Form BRII/23)

9.4.1 Test Equipment

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	Qty.	Description
A.	1	Slotted line, G.R. 874-LBA
B.	1	20 cm Adjustable Stub, G.R. 874-D20
C.	1	Standing Wave Indicator, HP 415B
D.	1	Signal Generator, AN/USM-16
E.	2	Adapters, 874 to BNC plug, GR 874-QBJA
F.	1	Adapter, 874 to N, GR 874-QNJA
G.	1	Adapter, C Male to N Female, UG 565 A/U
H.	1	Cable, 6 ft. RG9A, N Male, - N Male, HP AC-16F
I.	2	Cables, RG58, BNC Male - BNC Male, HP AC-16K, E

9.4.2 Procedure

A. Disconnect Receiver No. 1 from Antenna No. 1 at J34 (antenna cable entrance).

B. Connect test equipment according to Fig. 2.

C. Adjust the Standing Wave Indicator 415B as follows:

Control	Position
Balometer-crystal-200,000	Crystal
Range - SWR-DB	SWR
Gain	Midrange
High, Low	Low
Expand-Normal-5db	Normal

D. Set the USM-16 Signal Generator for the receive frequency, 50% amplitude modulation at 1000 cps and 0 dbm RF output. See equipment handbook T.O. 33.41-8-23.2.

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PREPARED BY [illegible] DATE 3/24/64				
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E. Adjust the slotted line probe for a maximum voltage as read on the 415B.

F. Adjust the adjustable probe for a maximum voltage.

G. Adjust the 415B gain control for a reading of 1 (extreme right) on the VSWR scale.

H. Move the slotted line probe for a voltage minimum as indicated on the 415B.

I. Read the antenna VSWR on the 415B VSWR scale and record.

J. Disconnect the antenna from the slotted line and reconnect to No. 1 Receiver.

K. Repeat for No. Receiver (J32).

10. OVERALL TESTS AN/MRC-80

10.1 Deviation and Baseband Gain (Form BRII/24)

10.1.1 Test Equipment

A. Signal Generator, USM-16

B. AC VTVM, HP-400D

C. Voltmeter, Sierra 125A

D. Oscillator, HP 200CD

E. Matching Transformer, HP AC60B

F. Attenuator, Kay 30-0

G. 600 Ohm Resistor

10.1.2 Procedure

A. The two transmitters will be tested individually, using the No. 2 receiver for the tests.

B. Disconnect cables W-A and W-B from connectors A and B on the front panel of receiver No. 2.

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C. Disconnect cable W-C from connectors C1 and C2 on the front panel of receiver No. 1 and use this cable to connect between terminals A and B on receiver No. 2.

D. Connect the signal generator to No. 2 receiver antenna jack.

E. Tune the receiver to the station transmit frequency.

F. Adjust generator to the station transmit frequency at a signal level of 15,000 microvolts.

G. Terminate the REC jacks on the front panel of the No. 2 receiver with a 600 ohm resistor.

H. Record the MEASURE meter reading with the MEASURE switch in the SIG LEV position.

I. Connect the HP 200 CD oscillator to the EXT. MOD. jack of the signal generator to provide external modulation of the R. F. signal.

J. Set the oscillator to a frequency of 20 KC.

K. Set the frequency deviation control on the USM-16 to mid-range and then increase the oscillator output to obtain an indicated deviation of 35 KC at stations using MC-50 multiplex and 62 KC at stations using TCC-7 multiplex.

L. With a balanced 600 ohm voltmeter, measure and record the voltage across the resistor at the output of the receiver. The output level should be -6 dbm after adjusting the receiver output control.

M. Without changing control settings on the receiver, connect test equipment as shown in Figure 3.

N. Load a transmitter into the dummy load.

O. Adjust the Kay Attenuator so that the signal level indicated on the receiver MEASURE meter is the same as in Step H. Record the signal level.

P. Adjust oscillator to a frequency of 20,000 cps.

Q. Adjust oscillator level to provide 0 dbm input at the XMTG jacks on the front panel of receiver No. 2 if TCC-7 multiplex is used. If MC-50 multiplex is used, set the output level of the oscillator to -10 dbm. (Allow 0.5 dbm loss through the bridging transformer.)

R. With a balanced 600 ohm voltmeter, measure and record the voltage across the 600 ohm resistor at the ouput of the receiver.

S. Repeat Steps M through R for transmitter No. 2.

10.2 Radio Baseband Frequency Response (Form BRII/24)

10.2.1 Test Equipment

A. AC VTVM, HP 400 D

B. Frequency Selective Voltmeter, Sierra 125A

C. Audio Oscillator, HP 200 CD.

D. Isolation Transformer, HP AC-60A

E. 600 Ohm Resistor

F. Attenuator, Adjustable, Kay 30-0

10.2.2 Procedure

A. Connect the test equipment as shown in Figure 4.

B. Adjust the Kay attenuator in the R. F. Path from Transmitter #1 to Receiver #1 for maximum attenuation.

C. Load Transmitter #1 into the dummy load.

D. Tune Rec. #1 to the Transmitter Frequency.

E. Adjust the Kay attenuator to obtain approximately 30 MV of 1st Limiter voltage on the Receiver #1 measure meter.

F. Vary the 200 CD Oscillation from 8 kc to 90 kc while keeping the output constant at 0 dbm as monitored on the 400 D.

G. Record the Sierra 125B Voltmeter readings on the data sheet.

H. Shut-off Transmitter #1.

I. Connect the Dummy Load and R. F. pick-up cable to Transmitter #2. Reconnect cable CX-2252.

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J. Load Transmitter #2 into the Dummy Load.

K. Repeat sections D through G of this procedure.

L. Return the equipment to normal operation.

11. LINK TESTS AN/MRC-80 (Form BR11/25)

11.1 Radio Noise and Spurious Tones

11.1.1 Test Equipment

A. Voltmeter, Sierra 125B

B. 135 Ohm resistor

11.1.2 Procedure

A. Disconnect the multiplex equipment from the receivers by removing the interconnecting cables from the XMTG and REC jacks on the front panel of receiver #2. Disconnect the MUX at the distant transmit terminal.

B. Terminate the receivers with a 135 ohm resistor.

C. Connect the voltmeter to the balance 135 ohm REC jacks on receiver #2.

D. While receiving an RF signal from the adjacent station, scan the 12 to 68 kc baseband with the voltmeter.

E. Record all noise and spurious responses greater than -55 dbm.

11.2 Link Radio Baseband Frequency Response

11.2.1 Test Equipment

A. AC VTVM, HP 400 D

B. Frequency Selective Voltmeter, Sierra 125B.

C. Audio Oscillator, HP 200 CD.

D. Isolation Transformer, HP AC-60A

E. 600 Ohm Resistor

11.2.2 Procedure

A. The station transmitting the baseband test signals will be Station A and the receiver station will be Station B.

B. Connect the test equipment for both Station A and B as shown in Figure 5.

C. Be certain that the transmitters and receivers are properly interconnected and tuned for normal station operation.

D. At station A, vary the 200 CD Oscillator from 8 kc to 90 kc as indicated on the data sheet while keeping the oscillator output constant at 0 dbm as monitored on the 400 V VTVM.

E. At Station B, record the Sierra 125B Voltmeter readings on the Link Test data sheet.

F. The two stations in the link should now reverse their roles of transmitting and receiving of the baseband test signals and repeat sections A through E of this procedure.

G. Return the equipment to normal operation.

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DRAWING NO. 6272878 17

FEE-2A (F)

PREPARED BY [illegible] DATE 3-10-64

CHECKED BY [illegible] DATE [illegible]

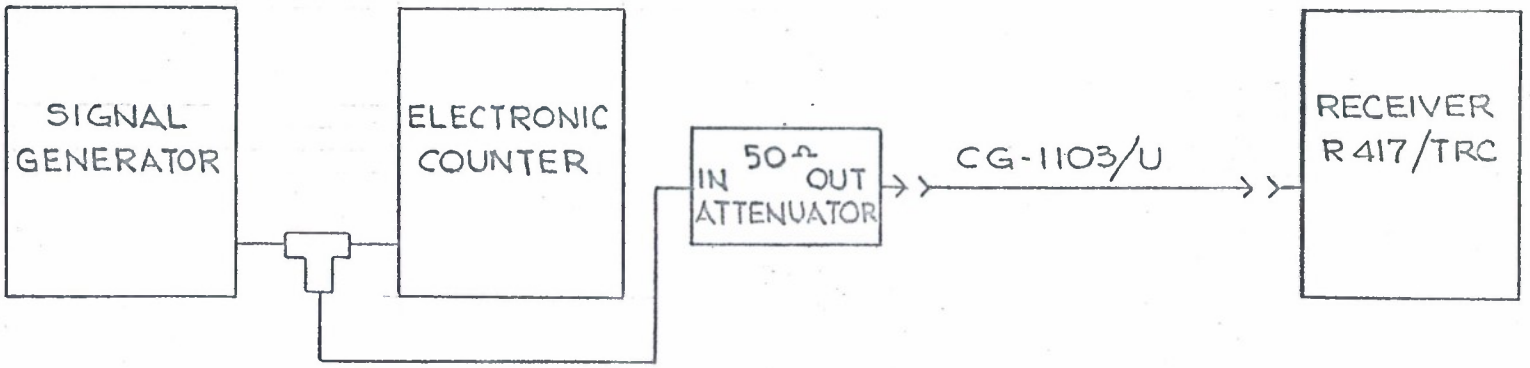
CODE IDENT. NO. 14842

DWG. SIZE A

FEC NO. 6272878

SHEET 17

(a)



(b)

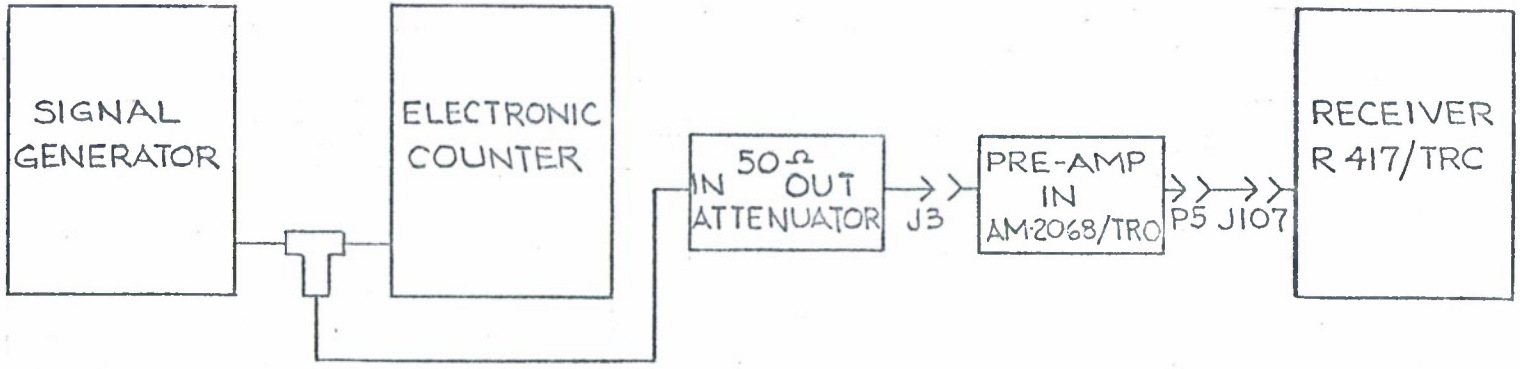


FIGURE -1

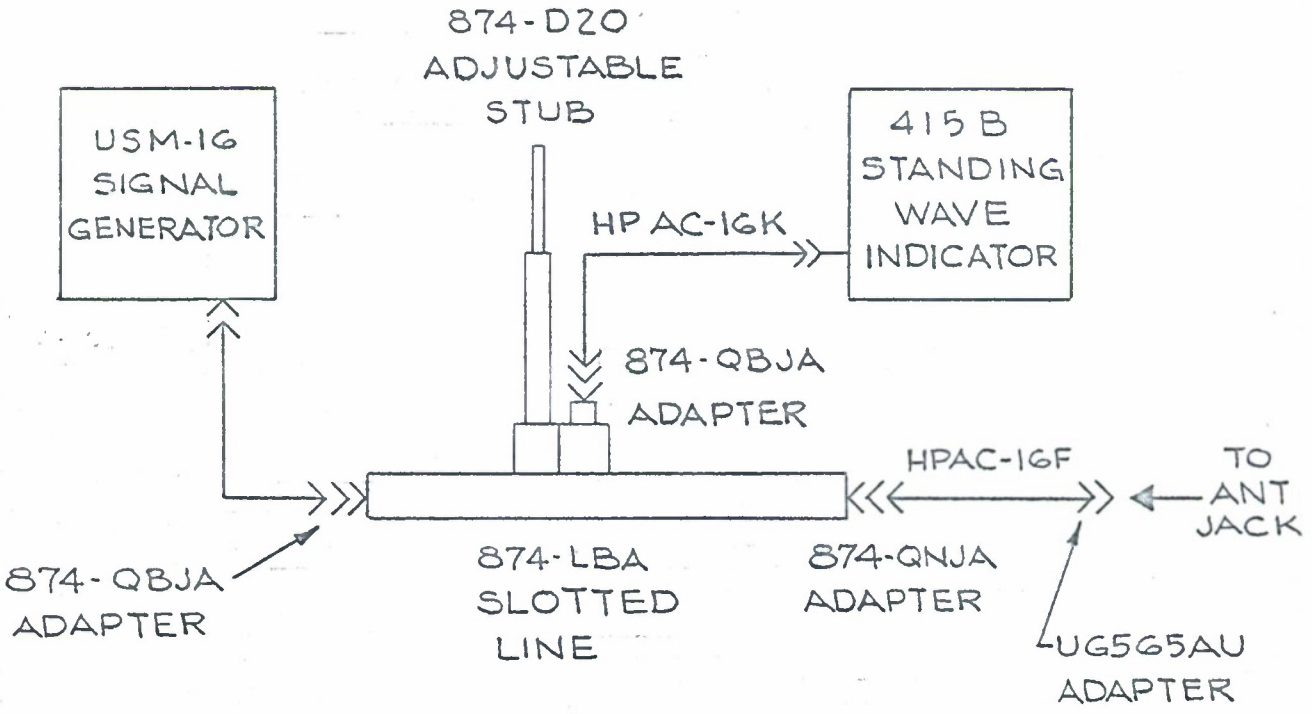


FIGURE-2

PREPARED BY [illegible] DATE 3-10-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272878 A
CHECKED BY [illegible] DATE 3/20/64		FEC NO.	SHEET 18

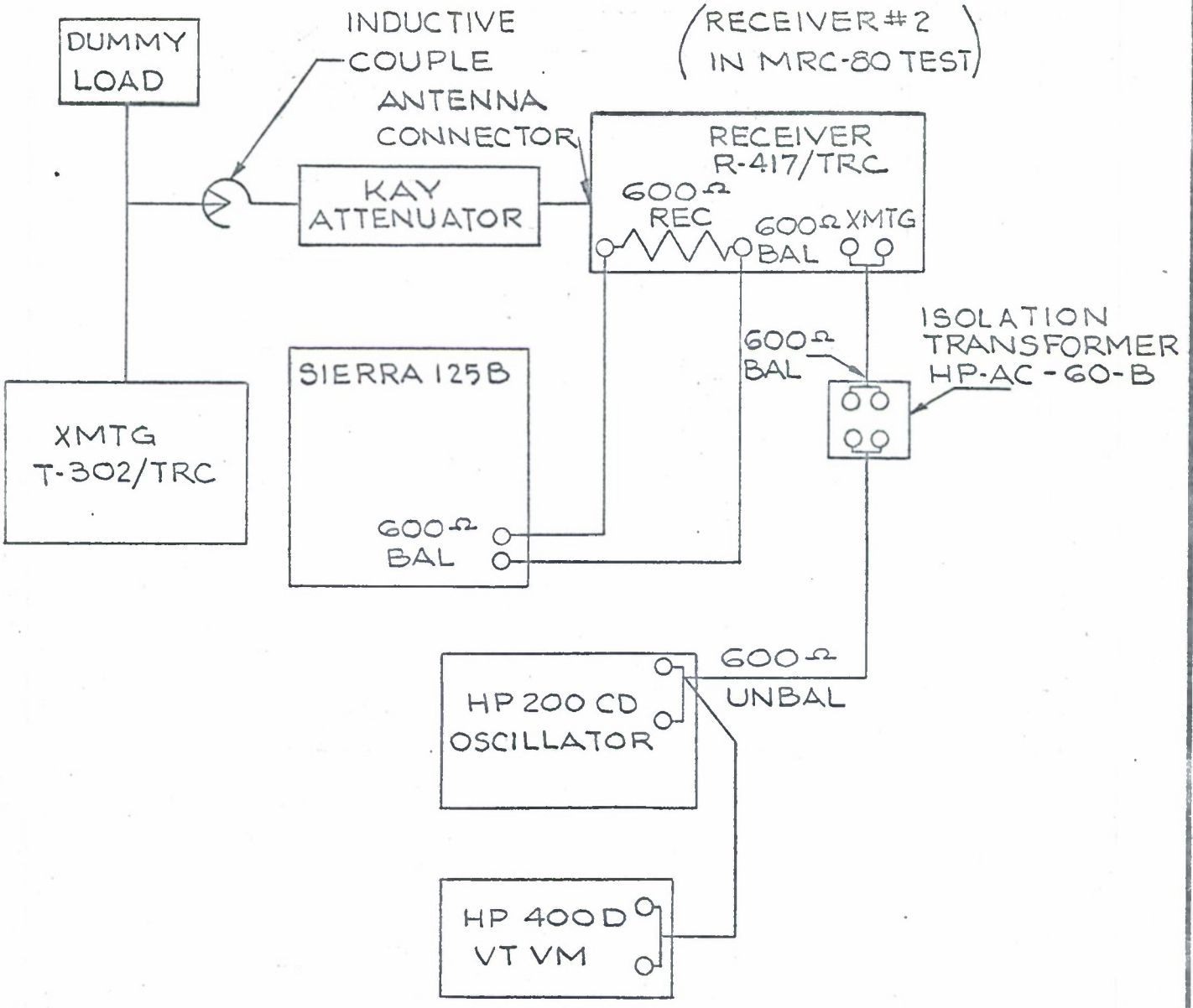


FIGURE-3

DRAWING NUMBER 6272878 B

PREPARED BY	DATE	CODE IDENT. NO.	DWG. SIZE	
[signature]	3-10-64	14842	A	6272878 A
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DRAWING NUMBER 6272878 20

PREPARED BY DATE 3-12-64
CHECKED BY DATE

CODE IDENT. NO. 14842
DWG. SIZE A
FEC NO. 6272878
SHEET 20

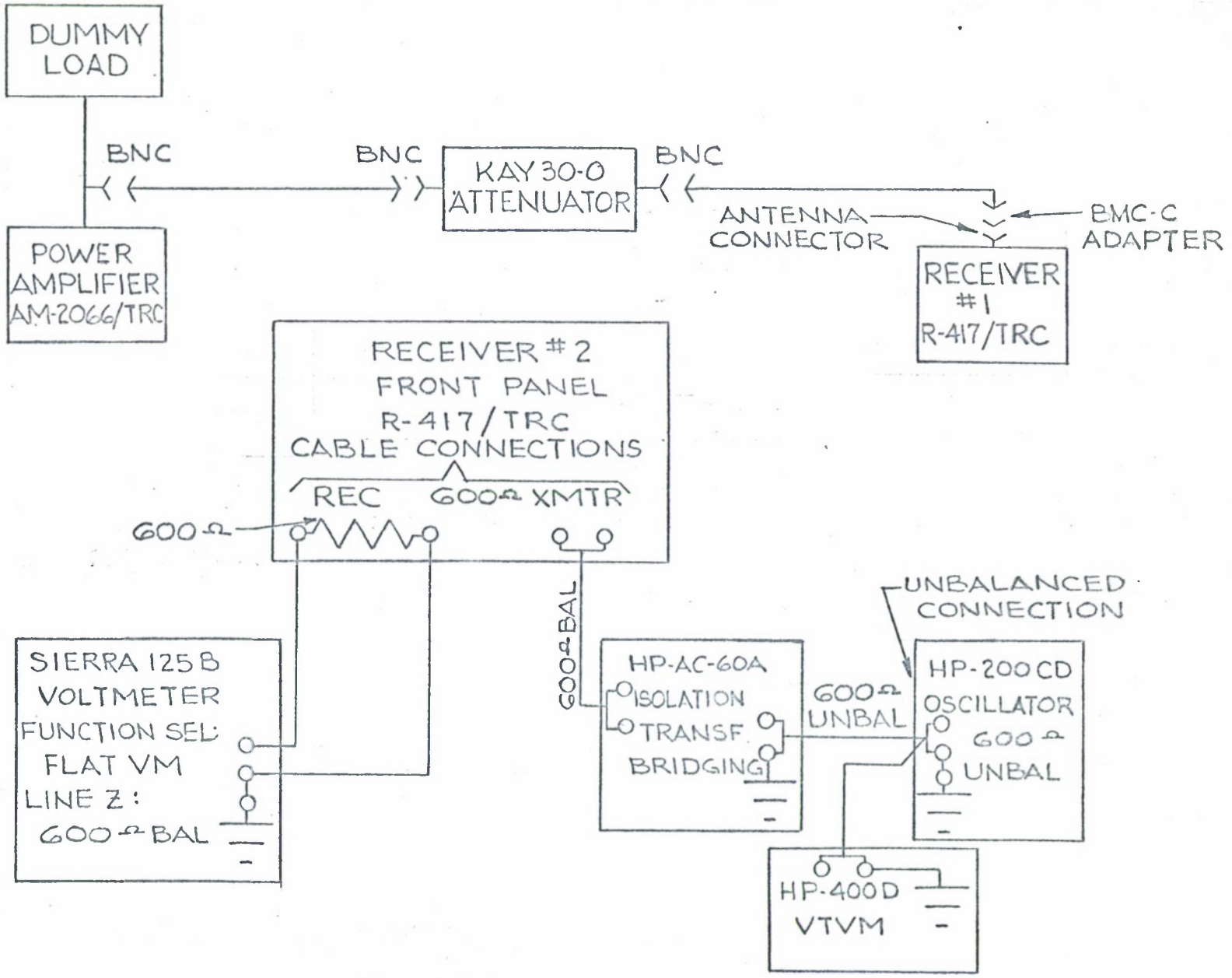

FIGURE-4

(RECEIVER #2 FRONT PANEL IN MRC-80 TEST)

RECEIVER FRONT PANEL R-417/TRC

CABLE CONNECTIONS

REC 600Ω XMTR

600Ω BAL

HP-AC-60A ISOLATION TRANSF BRIDGING

600Ω UNBAL

HP-200CD OSCILLATOR 600Ω UNBAL

HP-400D VTVM

STATION-A

(RECEIVER # 2 FRONT PANEL IN MRC-80 TEST)

RECEIVER FRONT PANEL R-417/TRC

CABLE CONNECTIONS

REC XMTR

600Ω

SIERRA 125B VOLTMETER FUNCTION SEL SELECTIVE 2500 CPS LINE Z 600Ω BAL

STATION-B

FIGURE-5

PREPARED BY	DATE	CODE IDENT. NO.	DWG.		
	3-10-64	14842	A	6272878	A
CHECKED BY	DATE		SIZE		
	3/10/64		FEC NO.	SHEET 21	

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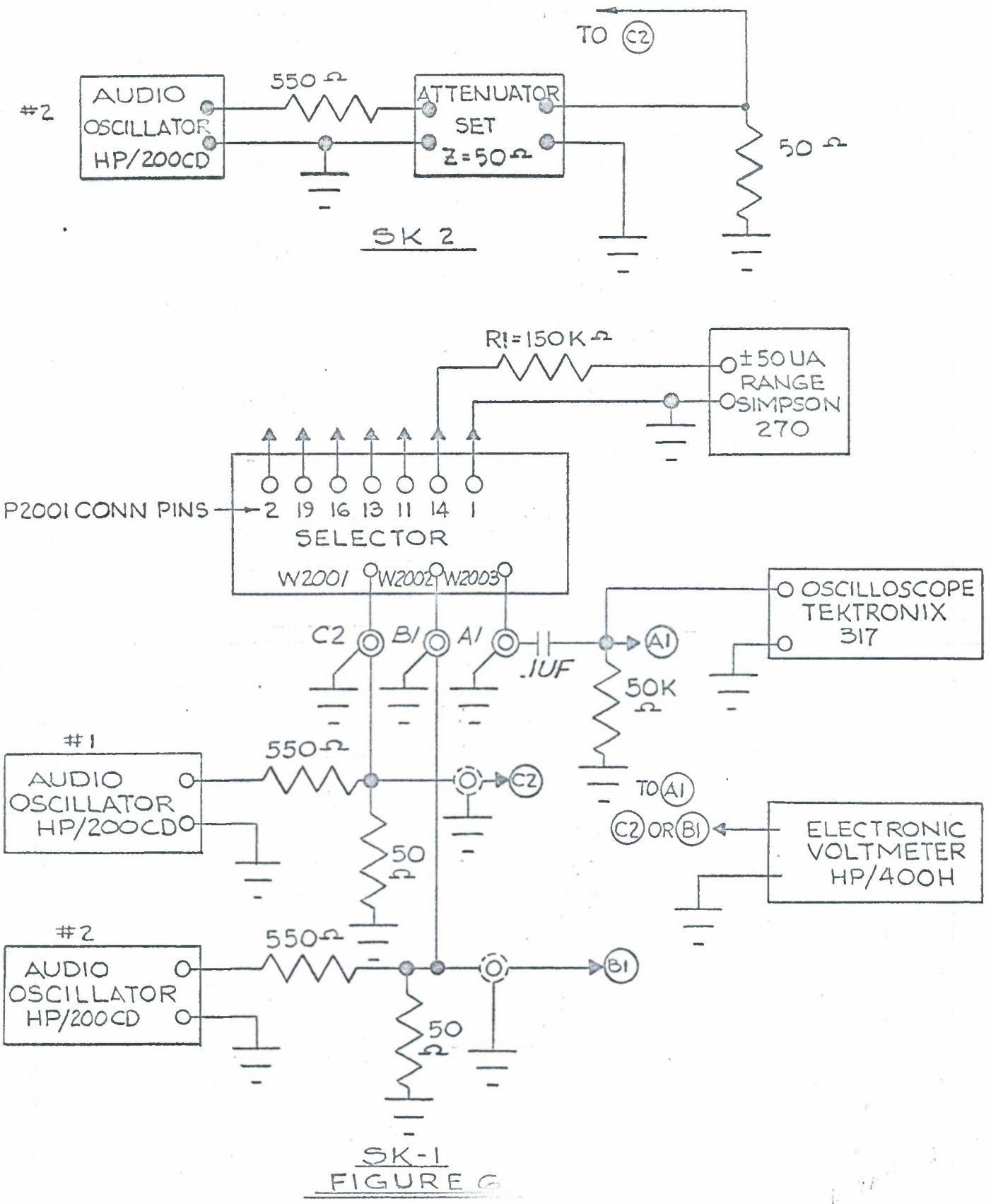

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	3-12-64	14842	A SIZE	6272878 A
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	3/16/64			

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DWG NO 6272879

FEE-2A (P)

SYM	ZONE	REVISIONS DESCRIPTION	DATE	APPROVED
A		ORIGINAL ISSUE		

SHEET NO	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68							
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A							
SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR	A	A	A																						
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR																									

GROUP		NEXT ASSEMBLY	FIRST USED ON
G			
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G1		6272925	

APPLICATION

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

COML. TOL. APPLY TO STOCK SIZES

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TEST PROCEDURES
RADIO SET AN/MRC - 85
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272879

SCALE | FEC NO. | SHEET 1 OF 68

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

1. SCOPE

1.1 This section outlines the testing procedures for the AN/MRC-85 Radio Set.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The equipment must be properly installed and placed into operation prior to the performance of the test procedures in accordance with manufacturer's manual.

3.2 Tests will be performed on equipment properly installed with all signal and power connections completed.

3.3 Equipment shall be operating with full power in accordance with approved maintenance procedures prior to performing these tests.

3.4 The equipment must be properly aligned prior to the performance of the tests. In case a failure occurs during the test and the indicated specification limits cannot be met, the equipment must be realigned in accordance with manufacturer's manual and the tests repeated.

4. PROCEDURE

4.1 The procedures for performing each test are included within this section.

4.2 The testing procedures shall be completed in the order presented.

4.3 The procedures outlined in the addendum will be used in the applicable tests where a Two Bay Performance Monitor exists.

5. REQUIREMENTS

5.1 Exciter

5.1.1 Frequency

5.1.2 R. F. Passband

5.1.3 Power Output

5.1.4 Baseband Deviation

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5.4.2 Baseband Frequency Response (Use addendum method)

5.5 AN/MRC-85 Link Tests

5.5.1 Radio Noise and Spurious Tone Levels

5.5.2 Baseband Frequency Response

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. EXCITER TEST PROCEDURE (FORM BRII/11)

7.1 Frequency

7.1.1 Test Equipment

A. Frequency Counter, HP524D

B. Attenuator Pad (10DB), Weinschel

C. Two Cables RG-9A/U

7.1.2 Procedure

A. Connect the frequency counter through the attenuator, to the RF Sample Jack (J1).

B. Measure and record the output frequency.

7.2 RF Passband

7.2.1 Test Equipment

A. Oscilloscope, Tektronix 317

B. Sweep Generator, Kay 860B-50

C. Signal Generator, HP608C

D. Detector, Sierra 148

E. 10DB Coaxial Attentuator, Narda 756-10

F. 3DB Coaxial Attentuator, Weinschel 50-3N.

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7.2.2 Procedure

A. Connect the equipment as shown in Figure 1.

B. Adjust the oscilloscope VERTICAL SENSITIVITY control so that the display occupies eight large vertical divisions.

C. Connect the 3DB coaxial attentuator in series with the output of the sweep generator and note on the oscilloscope the number of vertical divisions the display had dropped. These are the 3DB points of reference. Remove the 3DB coaxial attentuator and reconnect the sweep generator.

D. Calculate the 1DB point on the oscilloscope grid. If the display drops 2 large division or 10 small divisions for the 3DB coaxial attentuator, then the 1DB point is approximately 3 small divisions.

E. Decrease the signal generator frequency by varying the FREQUENCY control until the marker rests at the 1DB point calculated in Step D. Record the frequency reading on the signal generator.

F. Increase the signal generator frequency by varying the FREQUENCY control until the marker again rests at the 1DB point calculated in Step D. Record this frequency. Subtract the frequency reading obtained in Step E from that in Step F. Record the difference frequency. The response should be symmetrical around the 70MC center frequency.

7.3 Power Output

7.3.1 Test Equipment not required.

7.3.2 Read and record the power output on the Power Monitor.

7.4 Baseband Deviation

7.4.1 High Frequency Modulator Deviation

7.4.1.1 Test Equipment

A. Frequency Counter, HP 524D

B. Receiver, Hallicrafter SX62A

C. AC-VTVM, HP 400H

D. AF Oscillator, HP 650A

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E. AC/DC VTVM, HP 410B

F. Receiver, REL 70MC

G. 20DB Pad, Weinschel 50-20

H. Isolation Transformer, HP AC-60B

7.4.1.2 Procedure

A. Transfer modulator out of service.

B. Remove input cable to Order Wire, LF Modulator and HF Modulator on the 1A7 Modulation Amplifier Panel.

C. Disconnect the pilot tone oscillator by removing jumper cable from Radio Pilot Output (2) jack J53 and jack J55.

D. Set up test equipment as shown in Figure 2.

E. Set oscillator to frequency of 40.69KC and set level to 27.4MV as read on the HP 400H VTVM. (27.4MV is equal to -29DB on the HP400H DB scale). Check frequency with the EPUT Counter.

F. Connect AC Probe of HP 410B to HF level test J8.

G. Adjust HF level (1) Adj. Control R4 for a reading of 0.31 volts on the HP 410B.

H. Remove connection at HF Mod. Output jack J-14 and connect Probe of 410B to HF Mod. Output jack J-14.

I. Adjust HF level (2) Adj. Control R-44 for a reading of 0.5 volts on the HP 410B.

J. Set Mod. Mon function selector to position 3 and adjust Mod. Mon level Adj. Control R-111 for reading of ODBM on Mod. Mon Ind. Meter.

K. Adjust oscillator output level to 54.8 MV (-23DB) as read on the HP 400H VTVM.

NOTE: This level is now equal to -14 DBM at 75 ohms.

L. Note the level indication obtained on the HP 650A and record it for later reference.

M. Reduce output of 650A to zero and set up test equipment as shown in Figure 3.

N. With the reception switch of the SX62A set to "CW", tune the receiver around 70MC until a maximum indication is observed on the HP 400H VTVM.

O. Slowly reduce the RF sensitivity and audio controls of the SX62A until the peak tuned signal indicates approximately half scale on the HP 400H, when the range switch of the HP 400H is set to the -30 DB/.03V position.

NOTE: Check to ensure the proper 70MC signal is being received. Remove test connection at J-17 on the HF Modulator under test. Reading on HP 400H should fall completely to zero. If it does not, repeat steps N and O.

P. Short out pre-emphasis network by use of jumper wire from HF Pre-Emphasis jack J-66 to Ground Jack J-68 on the 1A7 Modulator Amplfier Panel.

Q. Increase power level of the HP 650A to exactly the reference level obtained in Step L.

NOTE: As the 650A level is increased note that the reading on the HP 400H decreases.

R. As the reference level on the HP 650A is reached, the minimum reading should also be reached on the HP 400H. This should be -40DB or less.

S. If the minimum or null does not occur exactly when the reference level on the HP 650A is reached, then proceed with the following:

T. Utilize a non-metallic alignment tool and adjust Mod. Sens. Adj. Control C-8 on the HF Modulator panel for an absolute minimum reading on the HP 400H.

NOTE: If adjustment of control C-8 fails to produce a sharp dip, it may be necessary to slightly increase the HF level (2) Adj. Control R-44 until a sharp dip can be obtained by adjustment of C-8.

U. Set up test equipment as shown in Figure 4.

V. Adjust HP 650A oscillator for a level of 27.4MV (-29DB as read on the HP 400H) at a frequency of 64 KC.

W. Disconnect cable from Wide Band Output jack J-28 on REL Receiver.

X. Connect HP 400H to jack J-28 and adjust Wide Band Ampl. Gain Adj. Control R-140 to obtain a reading of EXACTLY .014V (14MV) on the meter. If this level cannot be obtained, recheck the exciter deviation setting, steps K through X.

Y. Reconnect cable to Wide Band Output jack. Connect 75 ohm Resistor across input terminals of HP 400H and connect meter to J-14, Base Band output, on the Receiver Base Band Order Wire Amplifier Panel.

Z. Remove jumper from HP Pre-Emphasis jack J-26 and around Jack J-67 on the Exciter Modulation Amplifier.

AA. Record the level indicated on the VTVM.

AB. Remove test equipment set up, connect all input cables and pilot tone cable on exciter, place receiver back in service.

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7.4.2 Low Frequency Modulator Deviation

7.4.2.1 Test Equipment

A. Frequency Counter, HP 524D.

B. AC-VTVM, HP 400H

C. AF Oscillator, HP 650A

D. AC/DC VTVM, HP 410B

E. Receiver, REL 70MC

F. 20DB Pad, Weinschel 50-20N

G. Isolation Transformer, HP AC-60B

7.4.2.2 Procedure

A. Remove Modulator from service by transfer. (Assure that the Tune-Neutral-Reset Switch is placed in the Tune Position on Operating Exciter.)

B. Remove Order Wire and LF Modulator inputs.

C. Remove Pilot Tone output by disconnecting cable between Radio Output jack J-53 and J-55.

D. Set up equipment as shown in Figure 5.

E. Adjust HP 650A to frequency of 30 KC. Set level to 27.4 MV (-29 DB as measured on HP 400H VTVM.) Check frequency with EPUT Counter.

F. Connect Probe of HP 410B VTVM to low frequency level (1) test jack J-25 on the 1A7 Modulator Amplifier.

G. Adjust LF Level Adj. on the Modulation Amplifier for a reading of 1.10 volts AC.

H. Set up equipment as shown in Figure 6.

I. Connect HP 400H to J-2, Wide Band test (1), on the S1892 Combiner Panel. Record the indicated level.

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7.5 Order Wire Deviation and Gain

7.5.1 Test Equipment

A. Receiver, Hallicrafters SX62A

B. AC VTVM, HP400H

C. AF Oscillator, HP 650A

D. Two Transformers, HP-60B.

E. Adjustable Attenuator M-600 or equal.

F. 20db Pad, Weinschel 50-20N

7.5.2 Procedure

A. Remove the modulator from service by transfer. (Assure that the Tune-Neutral-Reset Switch is placed in the Tune Position on the Operating Exciter.)

B. Remove HF and LF Modulator Amplifier Inputs.

C. Remove pilot tone output by disconnecting cable between Radio Output jack J-53 and jack J-55.

D. Set up the equipment as shown in Figure 7.

E. Adjust the HP 650 A Oscillator to 13.3 KC. Set the oscillator output level to zero.

F. Adjust the SX 62A as follows:

Reception switch to CW position; Selectivity switch to XTAL, SHARP: Sensitivity control as required being careful not to overload the receiver. Tune the SX62A around 70 MC until a maximum indication is observed on the HP-400H when connected to the receiver speaker.

NOTE: Check to ensure the correct 70 MC signal is being received. Be certain the receiver is not overloaded. Adjust the inline attenuator and sensitivity control as required.

G. Slowly increase the HP 650A Oscillator output until the meter reading goes through a minimum. At this point,

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measure the oscillator output using the HP 400H. Record the level indicated on the VTVM.*

H. If a minimum does not occur at -19.5 DBM* re-adjust R 179 (Order Wire Level Adj.) on 1A7 (S-1880) Modulation Amplifier until a minimum reading is obtained.

I. Disconnect adjustable attentuator and SX-62A from exciter jack J-17 and connect J-17 through a 20 db Pad to receiver IF input jack J-1 on IF amplifier 6A11.

J. Connect the HP 400H VTVM to the 600 ohm balanced jacks J-25 and J-26 on baseband - OW amplifier 6A6 using the HP AC-60B matching transformer as a 600 ohm termination.

K. The output level of the Hp 650A oscillator should be the same as in step G.

L. Record the indicated level.*

7.6 Pilot Tone Level and Deviation

7.6.1 Test Equipment

A. AC VTVM, HP 400H

7.6.2 Preliminary

A. Disconnect the low frequency, high frequency and order wire modulation inputs to the exciter. Set the Tune - Neutral - Reset switch so that transfer does not occur.

7.6.3 Level Procedure

A. Connect equipment as shown in Figure 8.

B. Set RADIO PILOT LEVEL (1) on modulator amplifier fully clockwise.

C. Connect VTVM to RADIO PILOT LEVEL, (1) Jack J51 on the modulator amplifier.

D. Record Pilot Tone Level.

* These readings take into account the 1/2 db insertion loss of the HP AC60B transformer.

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Test Procedures Radio Set AN/MRC - 85	CODE IDENT. NO. 14842	DWG. SIZE A	6272879
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7.6.4 Deviation Procedure

A. Connect VTVM to the RADIO PILOT OUTPUT (1) Jack J52.

B. Connect cable between RADIO PILOT OUTPUT (2) jacks J53 and J55.

C. Adjust the RADIO PILOT LEVEL (1) ADJ. R235 on the modulator amplifier for 9.0 volts on the AC VTVM.

D. Remove the AC VTVM from RADIO PILOT OUTPUT (1) jack and connect it to RADIO PILOT LEVEL (2). Adjust R235 on the modulator amplifier for 1.6 volts on the AC VTVM.

E. Using the AC VTVM, measure and record the output level at J14, into 75 ohm load, on Baseband /Order Wire Amplifier Panel 6A6.

7.7 Dual Modulator Operation

7.7.1 Test Equipment not required.

7.7.2 Procedure

NOTE: Perform this procedure after all Deviation (HF, LF, OW and Radio Pilot) and Mixer Power Output Panel Alignment have been completed.

A. Interconnect exciters as shown in Figure 9.

B. Place the Tune - Reset - Transfer switch (located on the Transfer Panel) of both exciters to Neutral position.

C. Place Operate - Standby Switch (located on the Transfer Panel) of Exciter 1 to operate position and on Exciter 2 to Standby position.

D. Remove the RF Cable from J17 on the High-Frequency Modulator (S-1878) on Exciter 1.

E. Observe that transfer takes place; the modulator of Exciter 2 is driving the RF amplifier sections of Exciters 1 and 2. The RF output power from both exciters should remain relatively constant. Transfer indicator DS 1 on S-1942 of Exciters 1 and 2 becomes illuminated. Mod. fail indicator DS 2 on Transfer Panel S-1942 of Exciters 1 and 2 will flash momentarily during the transfer time. Illumination of the transfer lamps indicates transfer due to an RF failure.

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F. Reconnect the RF Cable to J17 on the High Frequency Modulator (S-1878) on Exciter 1. Momentarily place Tune - Reset - Transfer switch on S-1942 on either exciter in reset transfer position. Both exciters will return to normal operation and transfer indicator DS 1 on S-1942 will extinguish.

G. Remove the modulation cable 1W13 from J5 on High Frequency Modulator Panel S-1878 of Exciter 1. Observe that transfer indicator DS 1 on S-1942 of exciters 1 and 2 becomes illuminated. Mod. fail indicator DS2 on S-1942 of Exciter 1 and 2 will flash momentarily during the transfer time. Reconnect the modulation cable to J5 on S-1878 and momentarily place the Tune - Reset - Transfer switch in the reset transfer position. The transfer indicators will become extinguished.

H. Repeat steps D through G with Exciter 2 acting as the operate exciter and Exciter 1 acting as the standby exciter.

I. Initial data sheet.

8. POWER AMPLIFIER TEST PROCEDURE (FORM BRII/12)

8.1 Input Power

8.1.1 Test Equipment not required.

8.1.2 Read and record INPUT FORWARD meter.

8.2 Output Power

8.2.1 Test Equipment not required.

8.2.2 Read and record OUTPUT FORWARD meter.

8.3 Reflected Power and VSWR

8.3.1 Test Equipment not required.

8.3.2 Read and record OUTPUT BACK meter.

8.3.3 VSWR Calculation

A. Calculation of VSWR from a ratio of forward and reflected power can be made by using the following formula:

$$VSWR = \frac{\sqrt{P_f/P_r} + 1}{\sqrt{P_f/P_r} - 1}$$

where, P_f = Forward power in watts

P_r = Reflected power in watts

B. Using the power readings obtained in sections 8.2.2. and and 8.3.2 above, record the VSWR as determined from Table 1 on Page 15. It is required that VSWR be recorded to three significant figures. Therefore, the power ratio which is calculated should be equated to the nearest power ratio shown on the chart. This will give the required VSWR figure.

8.4 Fault Recycling

8.4.1 Test Equipment not required

8.4.2 Procedure

A. Set the AUTOMATIC NORMAL-RESET switch on ac control panel 3A3 to AUTOMATIC.

B. Throw the MAIN POWER circuit breaker on distribution panel 3A2 to OFF; within 2.5 seconds, throw the circuit breaker back to ON.

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CONVERSION TABLE I

POWER RATIO TO VSWR

P_f/P_r	VSWR	P_r/P_f	VSWR	P_f/P_r	VSWR	P_r/P_f	VSWR	P_f/P_r	VSWR
---	1.00	441	1.10	121	1.20	59	1.30	36	1.40
39601	1.01	367	1.11	110	1.21	56	1.31	34	1.41
9801	1.02	312	1.12	102	1.22	53	1.32	33	1.42
4624	1.03	268	1.13	94	1.23	50	1.33	32	1.43
2601	1.04	233	1.14	87	1.24	47	1.34	31	1.44
1681	1.05	205	1.15	81	1.25	45	1.35	30	1.45
1183	1.06	182	1.16	75	1.26	43	1.36	29	1.46
876	1.07	162	1.17	70	1.27	41	1.37	28	1.47
676	1.08	146	1.18	66	1.28	39	1.38	27	1.48
538	1.09	132	1.19	62	1.29	37	1.39	26	1.49

Example: If forward power is 10KW and reflected power is 125 watts, then the power ratio is $P_f/P_r = \frac{10,000}{125} = 80$. Converting this ratio to the nearest ratio on the chart shows that the VSWR is approximately 1.25. Since the VSWR is required to three significant figures, the value of 1.25 should be used for a ratio of 80.

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C. Observe that the BEAM VOLTS meter on meter panel 3A4 drops to zero and then automatically returns to its previous indication.

D. Adjust the red pointer of the BODY CURRENT meter on the meter panel so that it contacts the black indicating pointer, then return the red pointer to its previous position. The black pointer will remain in contact with the red pointer.

E. Observe that the BEAM VOLTS meter drops to zero and automatically returns to its previous position and that the black pointer of the BODY CURRENT meter is automatically separated from the red pointer.

F. Adjust the red pointer of the OUTPUT FORWARD meter on the Klystron carriage 3A1 so that it makes contact with the black pointer, then return the red pointer to its previous position. The black pointer will remain in contact with the red pointer.

G. Set the AUTOMATIC-NORMAL-RESET switch to RESET and then to AUTOMATIC.

H. Observe that the BEAM VOLTS meter returns to its previous indication, and the black pointer of OUTPUT FORWARD meter is released from the red pointer.

I. Initial data sheet if fault cycling operates properly.

8.5 Klystron Coolant Flow Rate

8.5.1 Test Equipment not required.

8.5.2 Read and record indication on KLYSTRON COOLANT FLOW meter.

9. RECEIVER TEST PROCEDURES (FORM BRII/13)

9.1 Receiver Front End Gain

9.1.1 R. F. Amplifier and Converter

9.1.1.1 Test Equipment

A. Signal Generator, HP 608C

B. Frequency Counter, HP 524D

C. RF Millivoltmeter, Boonton 91C

9.1.1.2 Procedure

A. Connect the equipment as shown in Figure #10.

B. Set the Frequency Out Control on the signal generator to the center frequency of the Receiver.

C. Adjust the signal generator RF output for an indication of 100 mv RMS on the RF voltmeter.

D. Note the generator input level. The ratio of the RF voltmeter reading to signal generator reading is the Receiver front end gain.

$$20 \text{ Log} \frac{100}{\text{Signal Generator Reading in mv}}$$

E. Record gain on data sheet.

9.1.2 Parametric Amplifier and Converter

9.1.2.1 Test Equipment

A. VHF Signal Generator, HP 608C

B. Frequency Counter, HP 524D

C. Power Meter, HP 431A

D. Thermistor Mount, HP 478A

9.1.2.2 Procedure

A. Connect the equipment as shown in Figure 11

B. Set signal generator to the receiver frequency using the frequency counter.

C. Set signal generator to a level of -40 dbm.

D. With the power meter connected to IF 1 through the thermistor mount, measure and record the output level.

9.2 Quieting Sensitivity

9.2.1 RF Amplifier or Parametric Amplifier

9.2.1.1 Test Equipment

A. Signal Generator, HP 608C

B. Frequency Counter, HP 524D

C. Voltmeter, Sierra 125B

9.2.1.2 Procedure

A. Connect the equipment as shown in Figure 12.

B. Set the HP 608 signal generator tuning control to the receiver frequency.

C. Turn the signal generator selector switch to CW and adjust the signal generator output control to zero.

D. Record the receiver noise output shown on the Sierra 125B voltmeter tuned to 30 KC.

E. Adjust the signal generator output control until the noise reading on the 125B decreases to 20 db.

F. Record the level indicated on the signal generator output control.

9.3 DC Control Voltage Level

9.3.1 Test Equipment

A. VHF Signal Generator, HP 608C

B. VTVM, HP 410B

C. 20 db Pad, Weinschel 50-20N.

9.3.2 Procedure

A. Remove the cable from BASEBAND COMBINER INTERCONNECTION jack J6 and the PILOT INTLK jacks J36 and J37 on the receivers.

B. Connect equipment as shown in Figure 13.

C. Set signal generator frequency control to the receiver frequency.

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D. Adjust frequency control on signal generator to obtain zero voltage reading at DISC BAL jack J21 on demodulator, as observed on the AC-DC VTVM.

E. From the HP/608C signal generator, send into the receiver preselector filter a -100 dbm signal for a parametric amplifier or a -97 dbm signal for an RF amplifier.

F. Connect the AC-DC VTVM to DC CONTROL VOLTAGE TEST JACK J13 on the noise amplifier.

G. Record the voltage level on the data sheet.

9.4 Diversity Combiner Action

9.4.1 Test Equipment

A. VHF Signal Generator, HP 608C

B. VTVM, HP 410B

C. Power Divider

D. Sierra 125 A/B frequency selective voltmeter.

E. 10 DB Coaxial Attenuator, NARDA 756-10

9.4.2 Procedure

A. Connect the equipment as shown in revised Figure 14, issue B.

B. Remove the cables from PILOT INTLK jacks J36 and J37 on the combiner panels.

C. Set the signal generator tuning control to the receiver frequency.

D. Adjust the signal generator tuning control to obtain zero voltage on the AC-DC VTVM connected at DISC BAL Jack J21 on the demodulator of either receiver.

E. Remove cable from BASEBAND INTERCONNECTION Jack J6 from both receivers.

F. Adjust the signal generator output control for minimum output.

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G. Connect a cable assembly RG-59/C between 75 OHM OUTPUT Jack J14 on the baseband order wire amplifier panel and the Sierra 125 A/B frequency Selective Voltmeter. Tune the Voltmeter to 30 KC.

H. Measure and record the baseband noise output of Receiver A.

I. Disconnect the cable assembly from BASEBAND OUTPUT Jack J14, Receiver A, and connect it to BASEBAND OUTPUT Jack J14 on baseband - order wire amplifier 6A6 of Receiver B.

J. Measure and record the baseband noise output of Receiver B using the Sierra 125 A/B frequency Selective Voltmeter.

NOTE: The noise output of Receiver A should be within 2.0 db of Receiver B.

K. Adjust the signal generator output until the baseband noise output of either receiver is reduced 30 db (30 -db quieting). Record the noise output of each receiver at J14.

L. Connect an RG-58 cable assembly equipped with two BNC male connectors between BASEBAND COMBINER INTERCONNECTION Jack J6 on combiner panel 6A7 of each receiver.

M. Measure and record the baseband noise output of each receiver. Requirement: 1.5 to 4.5 db less than that recorded in step H and J respectively.

N. Remove the RF input cable between the power divider and receiver A. Terminate the open side of the power divider with 50 ohms. The noise output should assume the value measured in Step K, Receiver B.

O. Reconnect the power divider and Receiver A and disconnect Receiver B from the power divider. Terminate the power divider as in Step N. The noise output should assume the value measured in Step K, Receiver A.

9.5 Receiver Pilot Tone Levels

9.5.1 Test Equipment

A. AC-VTVM, HP 400H

B. AC/DC VT VM, HP 410B

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9.5.2 Procedure

A. Connect equipment as shown in Figure 15.

B. Remove pilot tone interconnect cable.

C. Set the voltmeter for 100 volt range and connect the AC VTVM between PILOT LEVEL TEST Jack J25 and GRD Jack J35 on combiner panel.

D. Set the PILOT DEFEAT switch on the combiner to OFF and observe that PILOT DEFEAT indicator lamp DSI goes out.

E. Adjust PILOT TONE LEVEL ADJ control R58 on the combiner for reading of 10 volts on the AC VTVM.

F. Adjust PILOT BIAS ADJ R90 on combiner until RADIO PILOT fault indicator lamp DS4 on receiver control panel 6A9 goes on.

G. Readjust the PILOT TONE LEVEL ADJ control on the combiner for a reading 11.0 volts on the AC VTVM and observe that RADIO PILOT fault indicator lamp goes out.

H. Readjust the PILOT TONE LEVEL ADJ for a reading of 14.1 volts on the AC VTVM.

I. Remove the cable from PILOT INPUT Jack J17 on the combiner and observe that the RADIO PILOT fault indicator lamp on the receiver control panel goes on.

J. Reconnect the patch cord to the PILOT INPUT jack.

K. Set the PILOT DEFEAT switch on noise amplifier 6A8 to ON.

L. Set the PILOT DEFEAT switch on the combiner to ON.

M. Adjust NOISE AMPL PILOT LEVEL ADJ control R4 for a reading of 3 volts.

N. Set both PILOT DEFEAT switches to OFF.

O. Adjust NOISE AMPL PILOT BIAS ADJ control R86 for a reading of 75 volts on the AC-DC VTVM and observe that NOISE AMPL fault indicator lamp DS3 on the receiver control panel goes on.

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P. Slowly readjust the NOISE AMPL PILOT BIAS ADJ control until NOISE AMPL fault indicator DS3 goes out, for a reading of 3 volts on the AC-DC VTVM.

Q. Remove the patch cord from the PILOT INPUT jack on the combiner and observe the following:

1. The AC-DC VTVM indicates 75 volts.

2. NOISE AMPL fault indicator lamp DS3 and RADIO PILOT fault indicator lamp DS4 on the receiver control panel goes on.

R. Reconnect the patch cord to the PILOT INPUT Jack.

S. Initial data sheet if all indicators operate properly.

9.6 Receive Antenna System VSWR

9.6.1 Test Equipment

A. Frequency Counter, HP 524B

B. Signal Generator, HP 608C

C. Oscilloscope, Tektronix Model 317

D. Sweep Generator, Jerrold 900A

9.6.2 Procedure

A. Connect the equipment as shown in Figure 16.

B. Set the Frequency Out Control on the signal generator to the center frequency of the Receiver.

C. Set the Frequency Out Control on the sweep generator to the center frequency of the Receiver.

D. With the delay cable unterminated, set the controls of the Tektronix oscilloscope to obtain a display 18 spaces high as shown in Figure 17A.

E. Adjust the sweep generator sweep width to produce a display on the oscilloscope approximately 5 mc wide.

NOTE: Maintain the lowest possible output level from Sweep Generator to obtain the desired display.

F. Disconnect the antenna cable at the input to the pre-selector and connect the delay cable to the antenna cable as shown in Figure 16.

G. Measure the height of the trace on the oscilloscope at the center frequency Fc. The height should be 3 spaces maximum as shown in Figure 17B.

H. Compute and record the VSWR using the following formula:

$$\text{VSWR} \quad \frac{\text{MAX H} + \text{MIN H}}{\text{MAX H} - \text{MIN H}}$$

Where: MAX H is the height of oscilloscope display at Fc (set to 18 boxes) with delay cable un-terminated.

MIN H is the height of oscilloscope display at Fc with delay cable terminated in the antenna (3 boxes maximum for VSWR of 1.4).

Esample: Max H - 18 boxes, MIN H = 1 box

$$\text{VSWR} = \frac{18 + 1}{18 - 1} = \frac{19}{17} = 1.12$$

10. AN/MRC-85 OVERALL TESTS (FORM BRII/14)

10.1 Radio Intermodulation Ratio

10.1.1 Test Equipment

A. Performance Monitor of AN/MRC-85

10.1.2 Preliminary

A. Before performing this test remove the order wire and pilot tone inputs to the exciter and defeat the exciter transfer circuit.

B. Operate the pilot tone defeat switch to the ON position on the receivers. Disconnect the pilot tone and combiner interconnects.

10.1.3 Procedure

A. Connect the equipment as shown in Figure 18.

B. Turn the TEST SELECTOR switch on monitor converter to LOOP.

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C. Modulate the exciter with noise across the entire baseband.

D. Set the output level of the noise generator for the proper value as follows:

1. Connect a patch cord between LF MULT jack J12 on the noise generator and the 75 ohm INPUT jack J5 on ac voltmeter.

2. Adjust LF LEVEL ADJUST on the noise generator panel to obtain a reading of -17 dbm on the voltmeter.

3. Remove the patch cord from LF MULT jack J12 and connect the cord to HF MULT jack J18 on the noise generator.

4. Adjust HF LEVEL ADJUST on the noise generator panel to obtain -18 dbm reading on the voltmeter.

E. To insert the bandpass filter in series with the receiver output, make the following patch connections at the noise analyzer.

1. Connect OUT jack J8 to the 15 KC OUT jack.

2. Connect IN jack J7 to the 15 KC IN jack.

3. Turn AUDIO CHANNEL switch S1 to 15 KC.

4. Turn the two INTERMODULATION CAL control to 0.

5. Turn CHANNEL SWITCH S2 to AUDIO.

F. Establish the receiver output reference level by adjusting the METER LEVEL control until the noise analyzer meter reads 50.

G. Insert a band reject filter in the modulator input by making the following patch connections at the noise generator panel:

1. Connect IN jack J3 to the 15 KC IN jack.

2. Connect OUT jack J6 to the 15 KC OUT jack.

3. Readjust the output levels as instructed in Step D.

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H. Measure and record the intermodulation noise in the 15 KC frequency slot as follows:

1. Adjust the two INTERMODULATION CAL controls until the noise analyzer meter indicates 50.

2. Record the amount of intermodulation read directly from the INTERMODULATOR CAL controls.

I. Measure and record the intermodulation noise in the 55 KC frequency slot by repeating Steps A through H. To make this measurement, install 55 KC filters in place of the 15 KC filters and place the audio channel switch in the 55 KC position.

J. Measure and record the intermodulation noise in the 80 KC frequency slot by repeating Steps A through H. To make this measurement, install 80 KC filters in place of the 55 KC filters installed in Step I and place the audio channel switch in the 80 KC position.

K. Repeat Steps A through J using the same exciter and power amplifier with the second receiver.

L. Repeat Steps A through K using the second exciter, power amplifier combination with the second pair of receivers.

10.2 Baseband Frequency Response

10.2.1 Test Equipment

A. AC-VTVM, HP 400H

B. Audio Oscillator, HP 650A

C. 75 ohm termination, 75 ohm, 1/2 watt, 1%

D. Attenuator 20 db Weinschel 50-20N

E. AC/DC-VTVM, HP 410B

10.2.2 Preliminary

A. Before performing this test, remove the low frequency, high frequency and order wire modulation inputs and the pilot tone for the exciter being used in the test.

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B. On the receiver being used in the test, operate the pilot tone defeat switch to the ON position and disconnect the pilot tone and combiner interconnects.

10.2.3 Procedure

A. Connect the test equipment as shown in Figure 19.

B. Check J13 for a DC voltage of -5 ± 2 volts.

C. Apply a 30 KC tone at -20 dbm (-29 db as read on the HP 400H VTVM) to the input, J21, of the exciter.

D. Read -10 dbm ± 0.5 dbm (-19 db as read on the HP 400H VTVM) at J14 of the BB/OW Amplifier when terminated in 75 ohms.

E. Maintaining constant input level, vary the baseband oscillator frequency from 12 to 60 KC. Measure the response of the output in reference to the 30 KC reading.

F. Record the response which should be within -2,+1db of the 30 KC reference level.

G. Remove the patch cord from J21 (LF Input) and connect to J3 (HF Input) of the Exciter.

H. Maintaining constant -20dbm input level, vary the base-band oscillator frequency from 60 KC to 120 KC.

I. Record response which should be within ± 0.25 db of a 90 KC reference level.

J. Repeat Steps A through I using the same exciter and power amplifier with the second receiver.

K. Repeat Steps A through I using the second exciter, power amplifier combination with the second pair of receivers.

11. AN/MRC-85 LINK TEST (FORM BRII/15)

11.1 Radio Noise and Spurious Tone Levels

11.1.1 Test Equipment

A. Voltmeter, Sierra 125B

11.1.2 Procedure

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A. At the transmitting station, remove all order wire, low frequency, and high frequency modulation inputs to the exciter. The pilot tone input will not be disconnected for this test.

B. At the receive station, set function selector switch on the voltmeter to SEL VM 250 cycles and line impedance switch to 600 ohms.

C. Terminate the output of the receivers with a 75 ohm resistor at J-14 of BB/OW Panel 6A6 and connect the voltmeter across the resistor.

D. Turn the frequency control so as to scan the baseband frequencies while receiving an RF signal from the adjacent transmitting station.

E. Record all noise signals which are greater than -60 dbm. Do not record the signal at 60 KC since this is the pilot tone frequency.

NOTE: Since the Sierra 125B voltmeter provides direct dbm measurements for voltages appearing across a 600 ohm load, the noise indicated on the voltmeter in this test will be 9 db lower than actual level. Therefore, add 9 db to all readings before recording.

F. Reverse all test connections so that the transmitting station now receives and repeat Steps A through E.

11.2 Baseband Frequency Response

11.2.1 Test Equipment

A. AC-VTVM, HP 400H

B. Audio Oscillator, HP 650A

C. 75 ohm termination, 75 ohm, 1/2 watt, 1% Resistor

D. AC/DC VTVM, HP 410B

11.2.2 Procedure

A. Connect the test equipment as shown in Figure 20.

B. Connect the baseband oscillator to the EX-LF MOD input jack J21 of the exciter.

C. Adjust the baseband oscillator to 30 KC at -20 dbm (-29 db as read on the HP 400H).

D. Read -10 dbm ± 1.0 dbm (-19 db as read on the HP 400H) at J14 of the BB/OW Amplifier, terminated in 75 ohms.

E. Maintaining constant input level, vary the baseband oscillator frequency from 12 to 60 KC. Measure the response of the output level in reference to 30 KC.

F. Response should be -2,+1 db with respect to the 30 KC level.

G. Remove the patch cord from EX-LF MOD input J21 and connect it to EX-HF MOD input J3.

H. Maintaining constant input level, vary the baseband oscillator frequency from 60 KC to 120 KC.

I. Response should be ± 0.25 db with respect to 90 KC level.

J. Reverse all test conditions so that the transmitting station now receives and repeat Steps E through I.

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CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 28

TEST PROCEDURE ADDENDUM

1. SCOPE

A. These procedures are issued as an addendum to the AN/MRC-85 acceptance test procedures. The tests described measure the same performance characteristics of the radio set as the regular test procedures. The difference between the two sets of procedures is that the addendum procedures describe the tests using the two bay performance monitor instead of individual pieces of test equipment.

B. Either the regular test procedure or the addendum test procedure can be used to test any function. The choice of the test procedure used will be left to the discretion of the test team leader.

2. TEST REQUIREMENTS

2.1 Exciter

2.1.1 H.F. Modulator Deviation

2.1.2 L.F. Modulator Deviation

2.1.3 Orderwire Deviation and Level

2.1.4 Pilot Tone Deviation

2.2 Receiver

2.2.1 Diversity Combiner Action

2.3 Overall Tests

2.3.1 Exciter-Receiver Baseband Response

3. RECORDING RESULTS

3.1 Test results shall be recorded in triplicate on forms indicated with each test.

4. EXCITER TEST PROCEDURES

4.1 Exciter HF Modulator Deviation (Form BRII/16)

4.1.1 Test Equipment

A. Frequency Counter, HP 524-D

B. Performance Monitor, Bays 1 and 2

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ADDENDUM

C. AC-VTVM, HP 400H

4.1.2 Preliminary

A. Transfer modulator out of service

B. Remove input cables to order wire, LF modulator and HF modulator on the modulation amplifier panel 1A7.

C. Disconnect the pilot tone oscillator by removing jumper cable from Radio Pilot Output (2) jack J53 and jack J55.

4.1.3 Procedure

A. Connect equipment as shown in Figure 25.

B. With the 20 db button on the 70 MC attenuator 14A6 depressed, turn the FREQUENCY SELECTOR switch on carrier zero test receiver and oscillator 14A10 to 40.690 KC. Check this frequency with the eput counter.

C. Set ac voltmeter 13A8 to DIRECT or 75 OHM.

D. Short out the pre-emphasis circuit with a short piece of wire between HF PRE-EMPHASIS jack J66 to GROUND jack J67 on the modulator amplifier.

E. Remove the patch and cord connected to 75 OHM jack J3 on the carrier zero test receiver and oscillator.

F. With the ac Voltmeter on the 10 volt range, adjust OSC FREQUENCY VERNIER C11 on the carrier zero test receiver and oscillator for a maximum reading.

G. Insert the patch cord removed in step E into the 75 OHM jack.

H. Remove the patch cord from 1 MC output jack J2 on the carrier zero test receiver and oscillator and connect the cord to 75 OHM MULT jack J4 on the same panel.

I. With the ac voltmeter monitoring the output level, adjust the carrier zero test receiver and oscillator OUTPUT LEVEL control R35 for a reading of -14 dbm (the SET DEVIATION line) on the ac voltmeter.

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ADDENDUM

J. Connect the HP 400H voltmeter to J2, 1 MC OUT on the carrier zero test receiver.

K. Adjust MOD SENS ADJ control C8 on the hf modulator. panel for a minimum reading on the HP 400H voltmerer, increasing the sensitivity of the meter while adjusting.

L. Turn carrier zero test receiver and oscillator OUTPUT LEVEL ADJ control to minimum and slowly increase the output level until a dropout is seen on the HP 400H voltmeter.

M. Using the ac voltmeter, measure and record the output level of the carrier zero test receiver and oscillator at the 75 OHM MULT jack J4.

N. Repeat steps A through L on the second exciter.

4.2 LF Modulator Baseband Deviation (Form BRII/16)

4.2.1 Test Equipment

A. Perform Monitor, Bays 1 and 2.

B. AC VTVM, HP 400H.

4.2.2 Preliminary

This test will be performed immediately after the HF Deviation Test. Before this test can be performed, the receiver wide band amplifier gain and baseband level must be adjusted. To adjust the demodulator and baseband-order wire amplifier gain, proceed as follows:

A. Remove the cable from WB OUTPUT jack J28 on demodulator 6A10.

B. Connect equipment as shown in Figure 26.

C. Turn the selector switches on ac voltmeter 13A8 and on baseband oscillator 14A12 to 75 OHM.

D. Connect a cable between HF PRE-EMPHASIS jack J66 and GRD jack J67 on the modulation amplifier 1A7.

E. Connect baseband oscillator to HF MOD IN jack J3 on modulation amplifier 1A7.

F. Set the baseband oscillator frequency to 64 KC and adjust the output level for -20 dbm as measured on the ac voltmeter 13A8.

G. Adjust WB AMPL GAIN ADJUST potentiometer R140 for 14 millivolts on the 400H VTVM.

H. Remove the VTVM and reconnect the cable to WB OUTPUT jack J28 which was disconnected in step A.

I. Remove the cable connected between HF PRE-EMPHASIS jack J66 and GRD jack J67 on the modulation amplifier.

J. Disconnect the ac voltmeter 13A8 from the baseband oscillator and connect it to the 75 OHM MULT jack on bay 1 jackfield 13A7.

K. Adjust BASEBAND LEVEL ADJUST potentiometer R45 on the baseband-order wire amplifier to -10 dbm on the ac voltmeter.

L. Initial data sheet BRII/16 when all four receivers have been adjusted as instructed by steps A through K.

M. Proceed with the LF Deviation test using one of the adjusted receivers.

4.2.3 Procedure

A. Remove modulator from service by transfer. (Assure that the Tune-Neutral-Reset switch is in the tune position on operating the Exciter).

B. Remove modulation inputs from modulation amplifier 1A7.

C. Remove pilot tone output by disconnecting cable between radio output jack J-53 and J-55.

D. Turn INPUT SELECTOR switch on ac voltmeter 13A8 the OUTPUT SELECTOR switch on baseband oscillator 14A12 to 75 OHM.

E. Connect equipment as shown in figure 26, with the baseband oscillator connected to J21 of modulation amplifier 1A7.

F. Adjust the baseband oscillator for a frequency of 30 KC and an output level of -20 dbm.

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G. Remove the patch cord from the upper 75 OHM jack on the baseband oscillator and insert the cord in the 75 OHM MULT jack on bay 1 jackfield 13A7.

H. Remove the patch cord from MOD (1) INPUT jack J4 on the LF modulator.

I. Adjust the MOD SENS (2) ADJUST control C23 for a reading of -16.3 dbm on the ac voltmeter.

J. Reconnect the patch cord to the MOD (1) INPUT jack and remove the cord from the MOD (2) INPUT jack.

K. Adjust MOD SENS (1) ADJUST for a reading of -16.3 dbm on the ac voltmeter. Reconnect MOD (2) input cable.

L. Record the signal level indicated on the ac voltmeter. If the reading is slightly out of limits, adjust MOD SENS (1)and MOD SENS (2) equally for a correct reading.

M. Repeat steps A through L for the second exciter.

4.3 Exciter Order Wire Deviation and Level Test (Form BRII/16)

4.3.1 Test Equipment

A. Performance Monitor Bays 1 and 2

B. 2 test cord adapters Special WECO TYPE 241A PLUG to dual RG58/U with BNG, WIRED TIPS ONLY

4.3.2 Preliminary

A. The HF and LF deviation and level test must be performed before proceeding with this test.

B. Remove the modulator from service by transfer (assure that the Tune-Neutral-Reset switch is in the Tune position on the operating exciter).

C. Remove HF and LF modulation inputs from the modulation amplifier.

D. Remove pilot tone output by disconnecting cable between radio output Jack J-54 and J-55.

4.3.3 Procedure

A. Connect the test equipment as per FIG 27.

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B. Adjust the Baseband Oscillator to 13.3 KC @ -20 dbm 600 OHM POSITION.

C. Using the carrier Zero Test receiver and the 400H AC voltmeter, adjust OW LEVEL ADJ on MOD AMPL 1A7 for a null.

D. With the MOD MON meter switch in position 9, adjust OW MON LEVEL ADJ ON MOD AMP FOR A RED LINE INDICATION.

E. Connect the output to the attenuator panel to J1 IF INPUT of the 6A11 IF amplifier.

F. Adjust the Baseband Oscillator for 1 KC @ -20 dbm 600 OHM POSITION.

G. Connect the 13A8 AC voltmeter to the 600 OHM MULT jack on jackfield 13A7, with the voltmeter in 600 OHM position.

H. Adjust the OW LEVEL ADJ on the baseband Order Wire amplifier 6A6 for a level of -10 dbm as read on the 13A8 AC VOLTMETER.

I. Record the reading.

J. Repeat steps A through I for the second exciter.

4.4 Pilot Tone Level and Deviation (Form BRII/16)

4.4.1 Test Equipment

A. AC VTVM, HP 400H

B. Performance Monitor, Bay 1

4.4.2 Preliminary

A. The LF Modulator deviation test must be performed before proceeding with this test.

B. Disconnect the low frequency, high frequency and order wire modulation inputs to modulation amplifier 1A7. Set the Tune-Neutral-Reset switch so that transfer does not occur. Pilot Tone generator will remain connected for this test.

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ADDENDUM

4.4.3 Procedure

A. Set RADIO PILOT LEVEL (1) on modulator amplifier fully clockwise.

B. Connect HP 400H to RADIO PILOT LEVEL, (1) Jack J51 on the modulator amplifier.

C. Record Pilot Tone Level.

D. Connect the test equipment as per figure 28.

E. Disconnect the input to the LF input J21 on Mod AMPL 1A7.

F. Connect the pilot between J53 and J55 on MOD AMPL 1A7.

G. Disconnect HF MOD input to HF Modulator 1A9.

H. Adjust RADIO PILOT LF LVL ADJ on MOD AMPL 1A7 for a reading of -24.5 dbm on the AC VOLTMETER 13A8.

I. Reconnect the HF MOD input to the HF Modulator and disconnect both LF inputs to the LF Modulator 1A8.

J. Adjust the RADIO PILOT HF LVL ADJ on the MOD AMPL 1A7 for a reading of -24.5 dbm on the 13A8 VOLTMETER.

K. Reconnect both of the LF INPUTS to the LF MOD 1A8.

L. The reading on the voltmeter 13A8 should be -20 dbm. If it is slightly off readjust both the RADIO PILOT HF AND LF ADJ equally for a reading of -20 dbm.

M. Record the reading.

5. RECEIVER TEST PROCEDURES

5.1 Baseband Diversity Combiner Action (Form BRII/13)

5.1.1 Test Equipment

A. Performance Monitor

B. Signal Generator, HP 608-C

C. Capacitor 4 to 8 microfarad, 400 volt.

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ADDENDUM

5.1.2 Procedure

A. Connect the equipment as shown in Figure 29.

B. Connect a 4 to 8 microfarad, 400 volt capacitor between noise amplifier panel 6A8 DC CONTROL VOLTAGE Jack J13 and ground.

C. Set the signal generator to the receiver frequency.

D. Adjust the signal generator tuning control to obtain zero voltage on the VTVM connected at DISC BAL jack J21 on the demodulator of either receiver.

E. Remove the cable from BASEBAND COMBINER INTER-CONNECTION jack J6 from both receivers.

F. Turn the signal generator selector switch to CW.

G. Adjust the signal generator output control for minimum output.

H. Connect cable assembly RG58C/U between 75 OHM TERM jack J24 on the performance monitor bay 1 jackfield and BASEBAND OUTPUT jack J14 on baseband order wire amplifier 6A6 of receiver A.

I. Measure the baseband noise output of receiver A using AC voltmeter 13A8 in the performance monitor. Record the noise level.

J. Disconnect the cable assembly from BASEBAND OUTPUT jack J14 receiver A, and connect it to BASEBAND OUTPUT jack J14 on baseband-order wire amplifier 6A6 of receiver B.

K. Measure and record the baseband noise output of receiver B using the AC voltmeter in the performance monitor. The noise output of receiver B should be within ± 2 db of receiver A.

L. Adjust the signal generator output until the baseband noise output of either receiver is reduced 30 db.

M. Connect an RG-58 cable assembly equipped with two BNC male connectors between BASEBAND COMBINER INTER-CONNECTION Jack J6 on combiner panel 6A7 of each receiver.

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Test Procedures Radio Set AN/MRC - 85	CODE IDENT. NO. 14842	DWG. SIZE A	6272879
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ADDENDUM

N. Measure and record the baseband noise output of each receiver. Requirement: 1.5 to 4.5 db less than that recorded in I and K respectively.

O. Remove the RF input cable between the power divider and receiver A. Terminate the open side of the power divider with 50 ohms. The noise output should assume the value measured in Step K, Receiver B.

P. Reconnect the power divider and Receiver A and disconnect Receiver B from the power divider. Terminate the power divider as in Step N. The noise output should assume the value measured in Step K, Receiver A.

6. OVERALL TESTS

6.1 Exciter - Receiver Baseband Response (Form BRII/14)

6.1.1 Test Equipment

A. Performance Monitor, Bays 1 and 2.

6.1.2 Preliminary

A. Before performing this test, remove the low frequency, high frequency, and order wire modulator inputs and the pilot tone for the exciter being used in the test.

B. On the receiver being used in the test, operate the pilot tone defeat switch to the ON position and disconnect the pilot tone and combiner interconnects.

6.1.3 Procedure

A. Connect equipment as shown in Figure 30.

B. Turn TEST SELECTOR switch S1 on monitor converter 13A12 to loop.

C. Turn INPUT SELECTOR switch S1 on AC voltmeter 13A8 to 75 ohm.

D. Set baseband oscillator 14A12 for 30 KC and adjust the output level controls for -20 dbm.

E. Remove the patch cord from the baseband oscillator READ LEVEL 75 OHM jack and connect the cord to the 75 OHM MULT jack on Bay 1 Jackfield 13A7.

ADDENDUM

F. Observe and record the reading on the AC voltmeter.

G. Maintaining constant input level, vary the baseband oscillator frequency from 12 to 60 KC. Measure the response of the output in reference to the 30 KC reading.

H. Record the response.

I. Remove the patch cord from J21(LF Input) and connect to J3 (HF Input) of the Exciter.

J. Maintaining constant input level, vary the baseband oscillator frequency from 60 kc to 120 kc.

K. Record the response.

L. Repeat steps A through K using the same exciter and power amplifier with the second receiver.

M. Repeat steps A through L using the second exciter, power amplifier combination with the second pair of receivers.

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MODULATOR TRANSFER ADJUSTMENTS

I. ADJUSTMENT OF RF SAMPLE E1

The RF Sample output jack, J11 of RF Sample E1, is located at the outer left-hand side of the exciter housing. The method of adjusting the RF Sample voltage level is described below.

A. Test Equipment

HP 431C Power Meter with 478A Thermistor mount

B. Procedure

1. Connect the microwave power meter to RF Sample jack J11 and measure the output power level. The power indicated on the meter should be between 1.5 and 2.5 milliwatts.

2. If this level is not obtained, loosen the knurled collar on J11 and turn J11 until the meter indicates 2.0 milliwatts. Tighten collar after adjustment.

II. LINE STRETCHER AND TRANSFER PANEL ADJUSTMENTS

The delay line detector uses the principle of slope detection to demodulate the FM carrier. The output of the detector, consisting of mux plus 60KC pilot tone, is applied to Transfer Panel 1A11.

Two adjustable line stretchers are used to position the slope of the modulation characteristic at the detector for optimum operation. The line stretchers will require adjustment only if the operating frequency has been changed or if measurements indicate improper operation.

The delay line detector consists of line sample E1, delay detector DC1, delay cable W1, and adjustable line stretchers W18 and W19, with W18 terminated in short circuit termination AT1. These components are all mounted on the inner left-hand side of the exterior housing. The adjustable sections of the line stretchers are secured by thumbscrew clamps, with the clamp securing the adjustment of W19 hidden behind a cover plate located on the inner left-hand side of the exciter housing below the control panel.

A. Test Equipment Required

1. RF Voltmeter, Boonton Model 91 CA.

2. VTVM or VOM

3. BNC T Adapter

4. AC VTVM Hewlett-Packard Model 400 L

5. Performance Monitor, REL Type 1007

B. Line Stretcher Adjustment

1. On both the vertical and horizontal exciter transfer panels (1A11) place the OPERATE-STANDBY switch at OPERATE and the TUNE-NEUT-RESET TRANSFER switch at TUNE. This prevents automatic exciter transfer during adjustment.

2. Remove the cover plates on the inner left-hand side of the exciter housing to expose the line stretcher.

3. Connect exciter power output cable to dummy load. See Note.

4. Disconnect cable 1W2 from jack J2 on line sampler E1 and connect the RF voltmeter to J2 instead.

5. Measure the RF output voltage at J2. The voltage should be 1.0V RMS. If necessary, loosen the knurled clamp wheel at J2 and turn J2 to adjust the output to correct value. Then tighten the clamp and reconnect cable 1W2 to J2.

6. Connect a BNC T adapter between cable W5 and RADIO PILOT jack J14. Connect a VTVM or VOM (Neg volts) to BNC T.

7. Loosen the line stretcher thumbscrew clamps. Pull up on the upper line stretcher (W18) extending it to its maximum length.

8. Vary the length of lower line stretcher (W19) to obtain either a maximum or minimum reading on the VTVM. Then tighten the thumbscrew clamp to lock the adjustment. Note the VTVM reading.

9. Carefully shorten the upper line stretcher (W18) until a maximum or minimum reading (the opposite of that obtained in Step 8 above) is observed on the VTVM. Note this reading.

10. Adjust the upper line stretcher for a voltage reading of approximately one half the difference between the maximum and minimum readings. Tighten the thumbscrew to lock the adjustment.

11. Connect the AC VTVM to LEVEL (2) TEST jack J8 of Transfer Panel 1A11 and observe the reading. The meter should indicate 2.0V RMS. If necessary, adjust the LEVEL ADJ potentiometer on the transfer panel to obtain 2.0V RMS at J8.

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12. Decrease the amplifiers power output by the Amplifier 3 Cathode Current adjust. Note if pilot level at J8 increases or decreases.

13. Adjust lower line stretcher until the opposite condition observed in 12 above is obtained.

14. Adjust line stretcher (between points noted in 12 and 13 above) until an increase or decrease of Amplfier 3 CathodeCurrent has negligible effect on the pilot level measured at J8. Tighten the thumbscrew to lock the adjustment.

15. Vary the exciter power output $\pm$ 3 db, by the Amplifier 3 Cathode Current adjust, while observing the pilot level at J8. The pilot level should remain within 5 db of the 2.0 V reference level.

16. Apply white noise loading to both the HF and LF modulation amplifier inputs (Noise Generator level controls set for maximum output). The pilot level at J8 should remain within 1 db of the 2.0V reference level.

If the requirements of 15 and 16 are not met, it is an indication of improper line stretcher adjustment or a change in the bandpass characteristics of the power amplifier with a change in Cathode Current.

C. Transfer Panel Alarm Adjustments

1. Upper Limit Adjust

a) Increase level at J8 to 3.0V with Level Adjust potentiometer.

b) Adjust U. L. Potentiometer for a 'just operate' (alarm) condition.

c) Reduce level at J8 to 2.0V after making adjustment.

2. Lower Limit Adjust

a) Decrease pilot level at J8 to 1.2V with LEVEL ADJUST potentiometer.

b) Adjust L. L. potentiometer for a 'just release' (alarm) condition.

c) Reset level at J8 to 2.0V with LEVEL ADJUST potentiometer.

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D. Restoral to Service

1. After adjustments have been completed, restore the TUNE-NEUT-RESET TRANSFER switch on Transfer Panels 1A11 to the NEUT position.

2. Recheck level at J8 and reset to 2.0V if required.

NOTE

If path conditions permit, make line stretcher adjustments with exciter output connected to power amplifier input. Check that the P. A. input tuning controls are set for minimum input back power.

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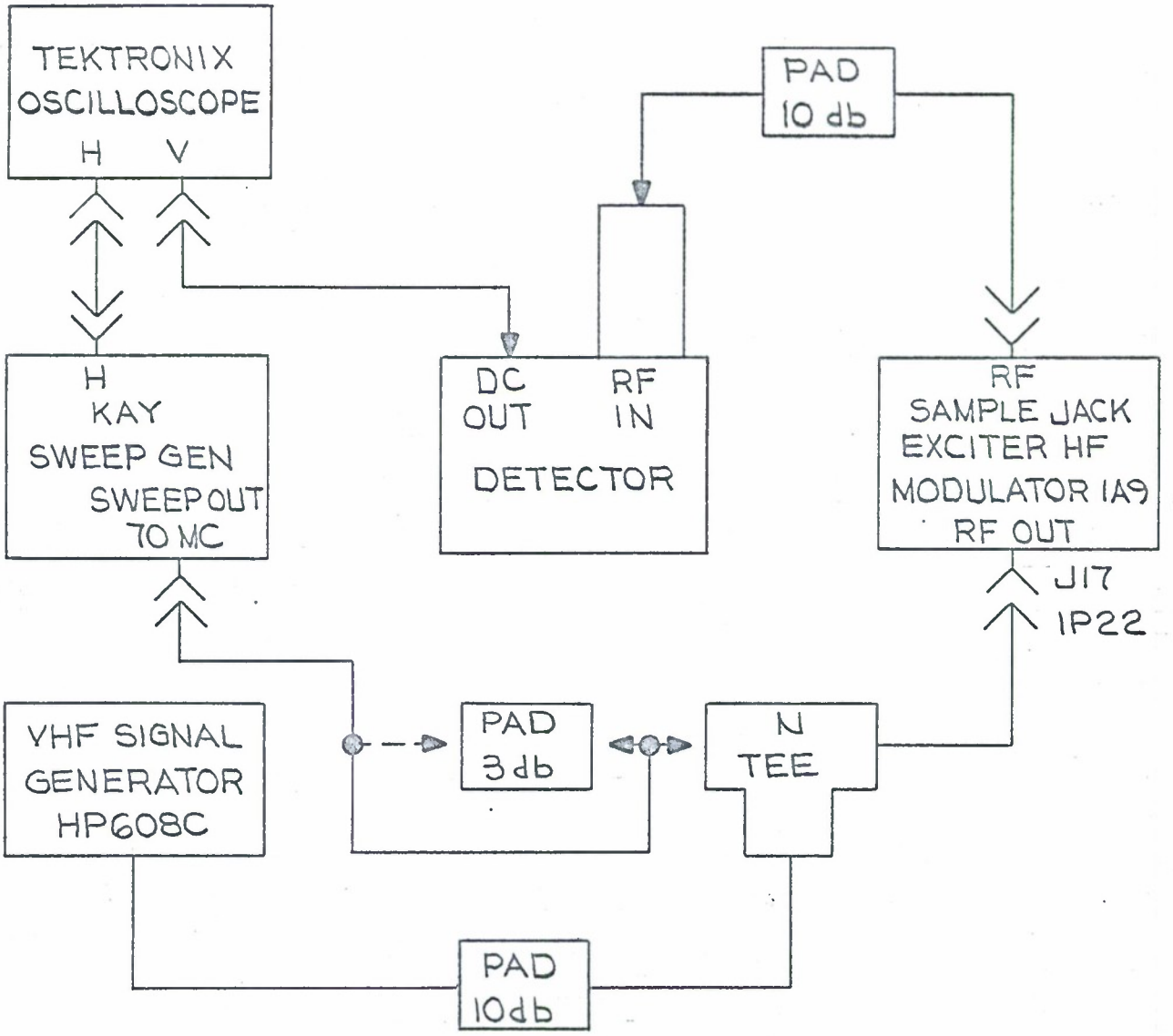

FIGURE 1

PREPARED BY R.B. Smith DATE 3-12-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY W.F. Lee DATE 3/16/64		FEC NO.	SHEET 43

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DRAWING NUMBER 6272879 4

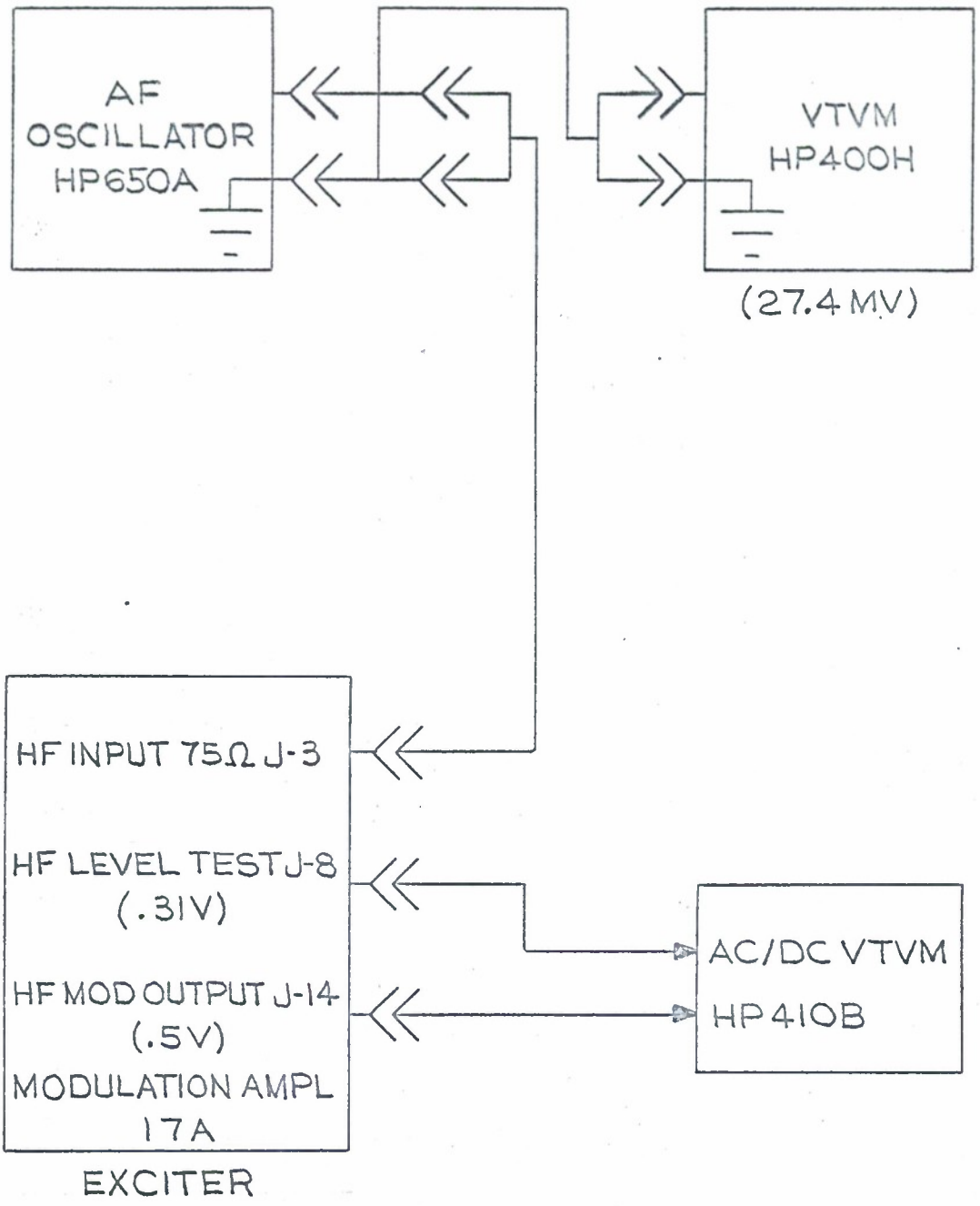

FIGURE 2

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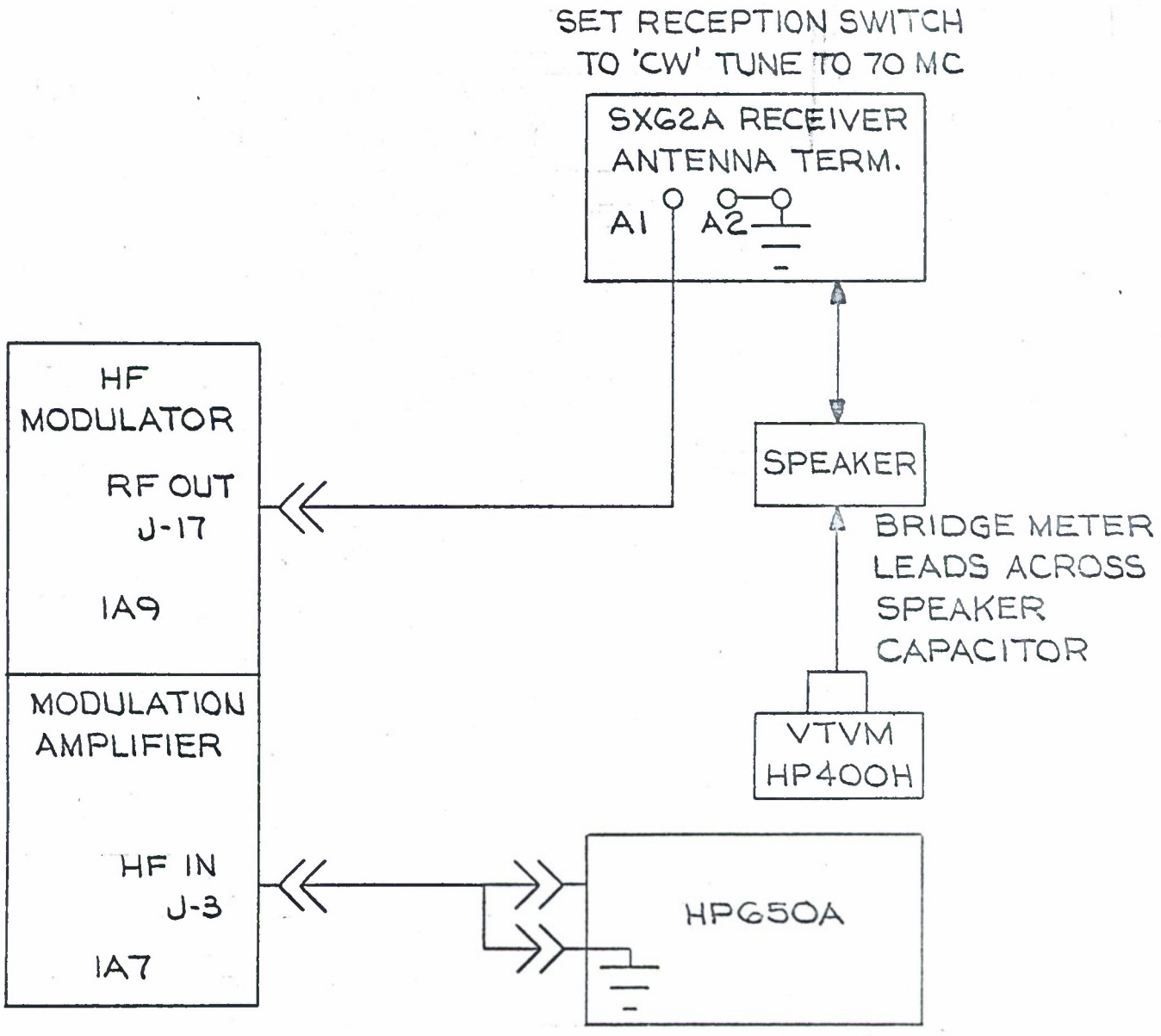

FIGURE 3

PREPARED BY R.D. Foster DATE 3-16-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879
CHECKED BY M. Roberts DATE 3/16/64		FEC NO.	SHEET 45

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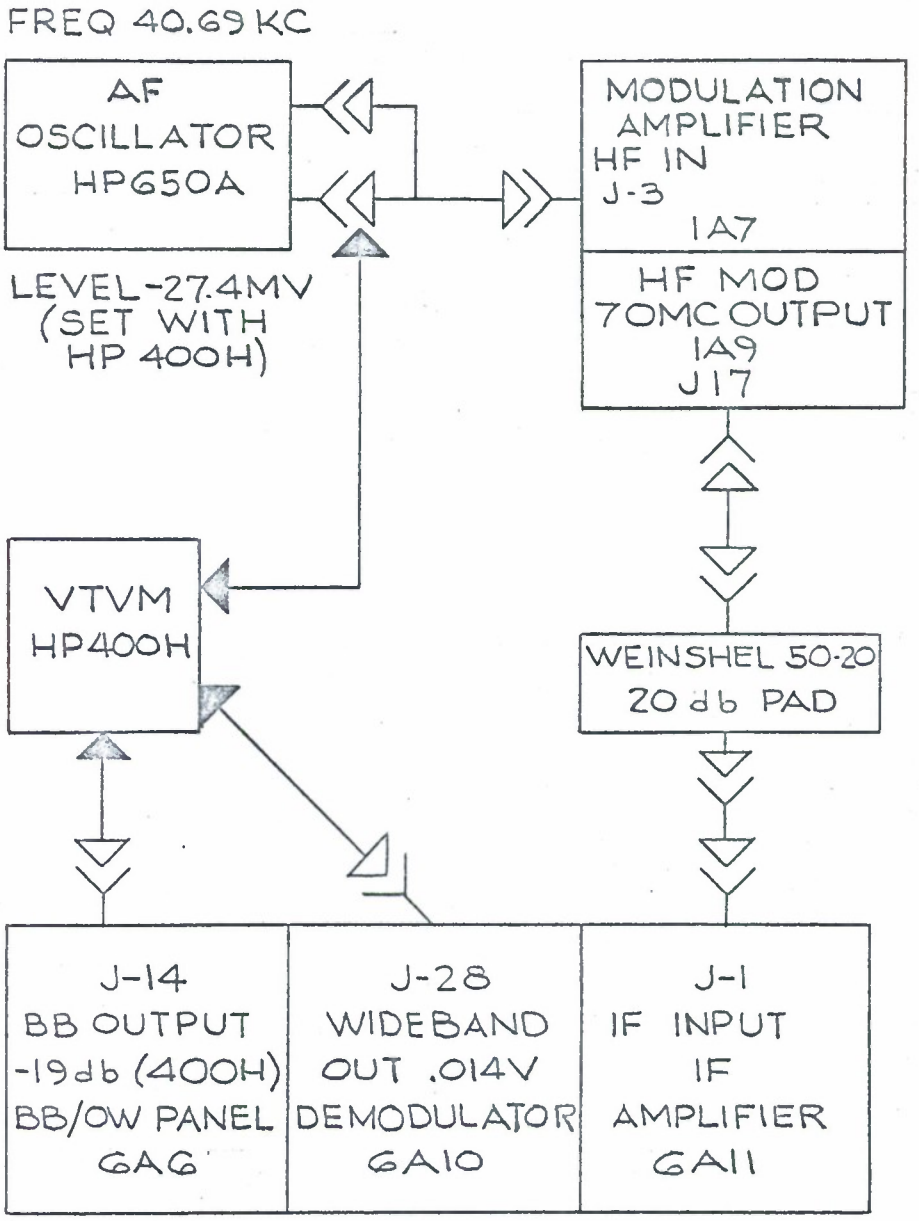

CONNECT 75Ω RESISTER ACROSS HP-400H TERMINALS WHEN MEASURING OUT JACK J-14. READING AT J-14. OF -19db ON HP400H IS EQUAL TO -10dbm AT 75Ω

FIGURE 4

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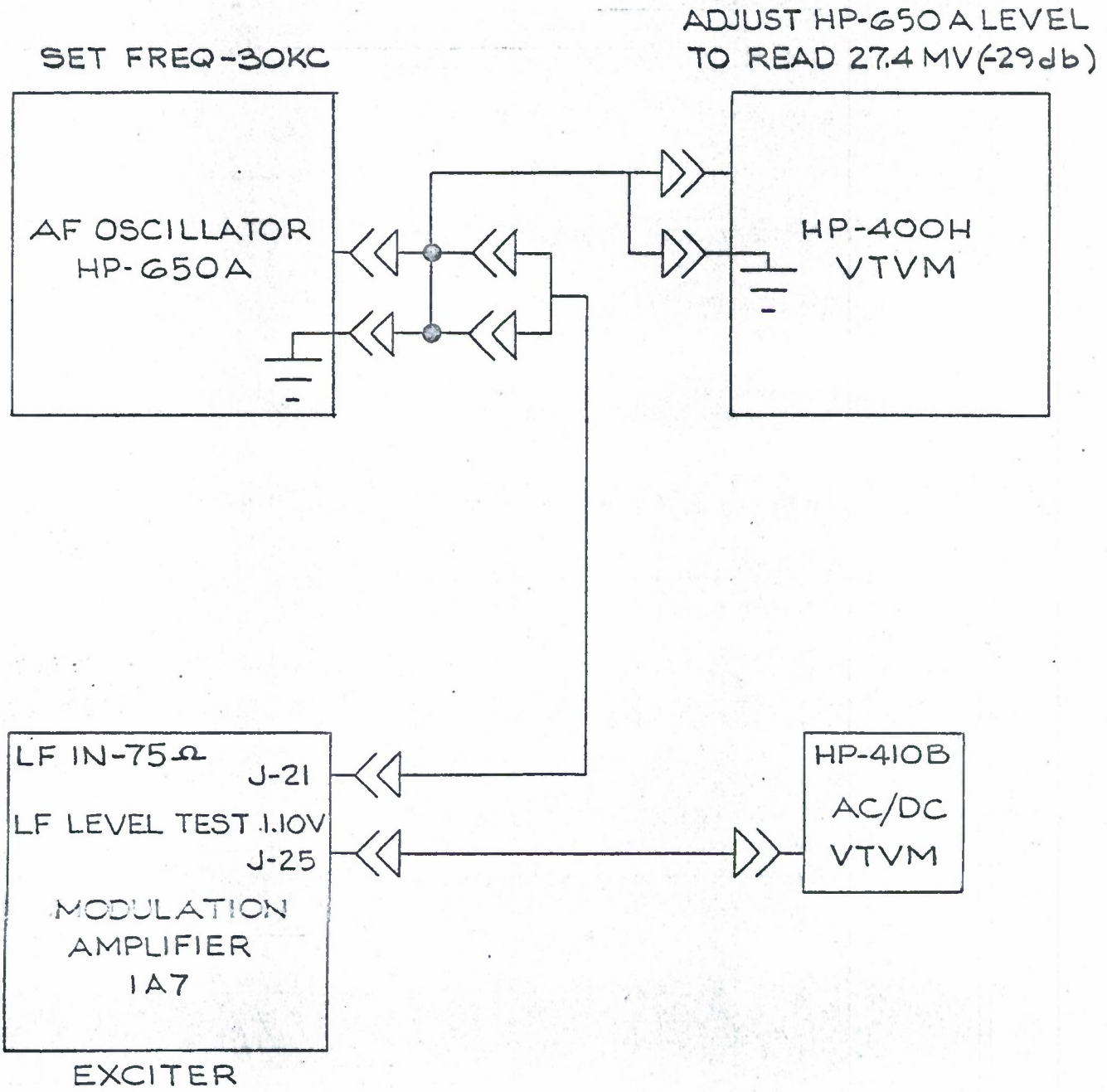

FIGURE 5

PREPARED BY K. D. Lyons DATE 3-17-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE 3/17/64		FEC NO.	SHEET 47

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EXCITER LF DEVIATION TEST

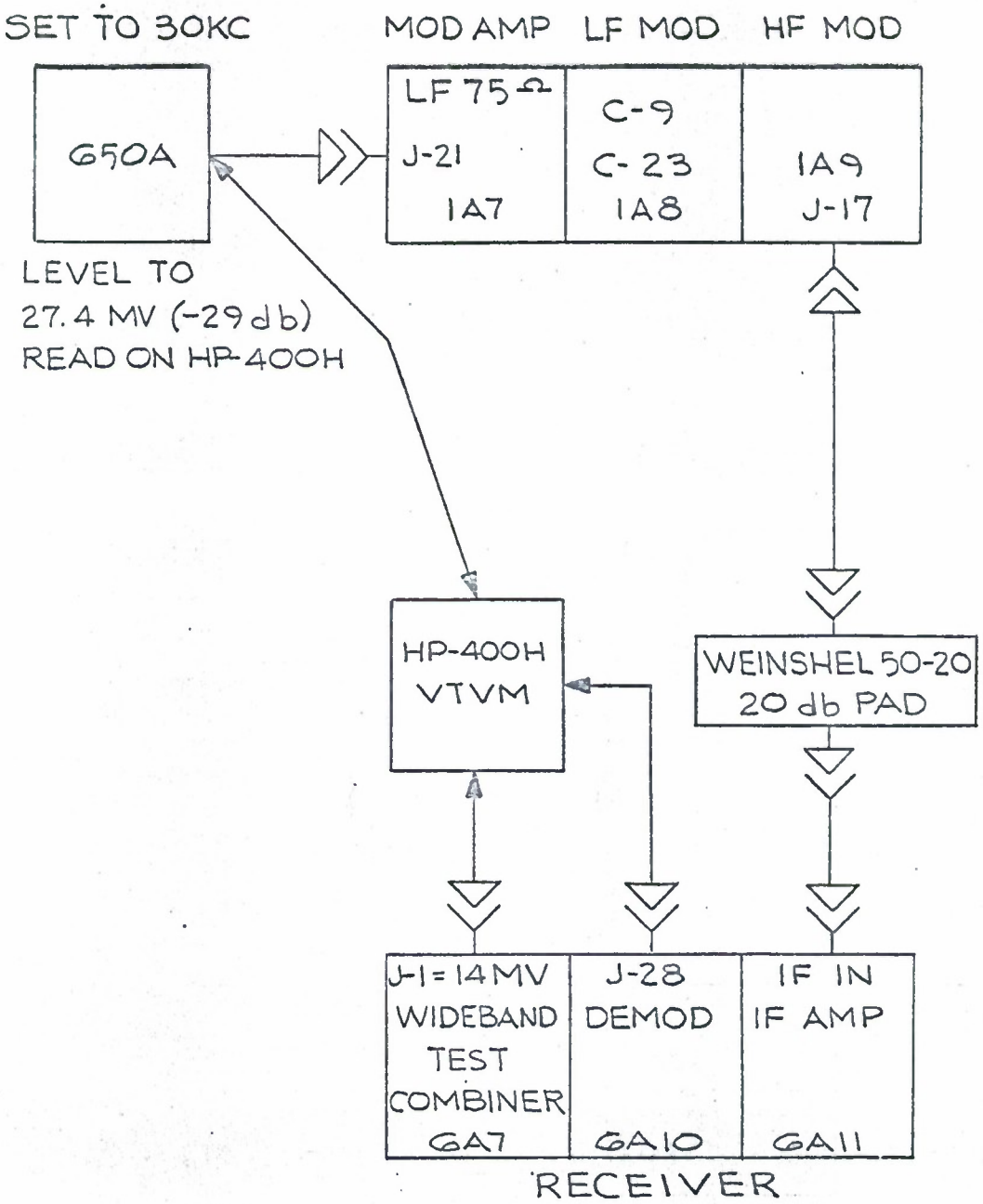

FIGURE 6

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CODE IDENT. NO.	DWG.	
14842	A SIZE	6272879 A

DATE 3-17-69
CHECKED BY [illegible] DATE 3/20/69
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SHEET 48

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

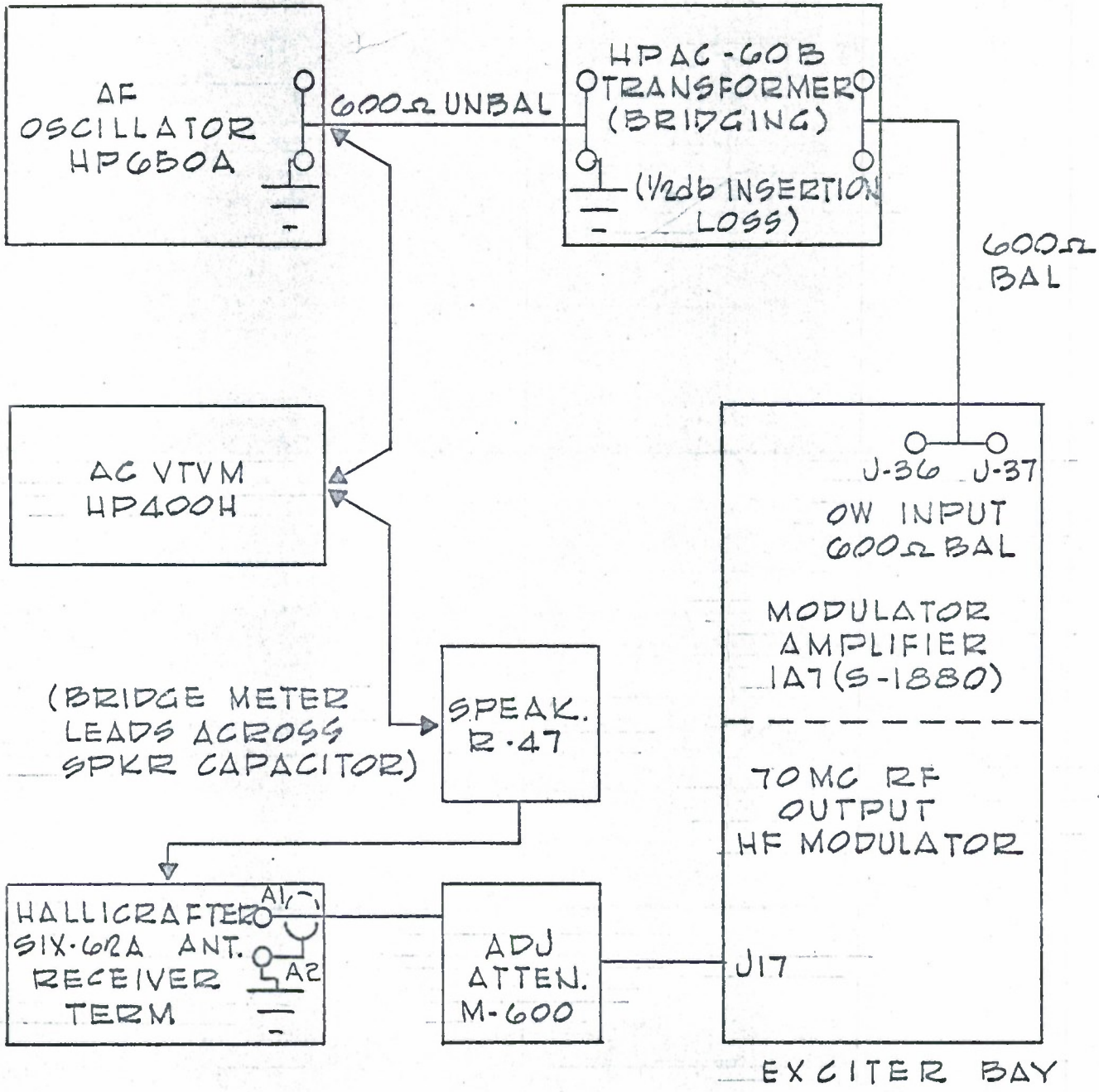


FIGURE 7

FEDERAL ELECTRIC CORPORATION
PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

FEE-2A (E) 10/49

DRAWING NO. 6272819

F. BECK 3-10-64
PREPARED BY DATE

CHECKED BY DATE

CODE IDENT. NO. 14842

DWG. SIZE A

6272879 A

FEC NO.

SHEET 49

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

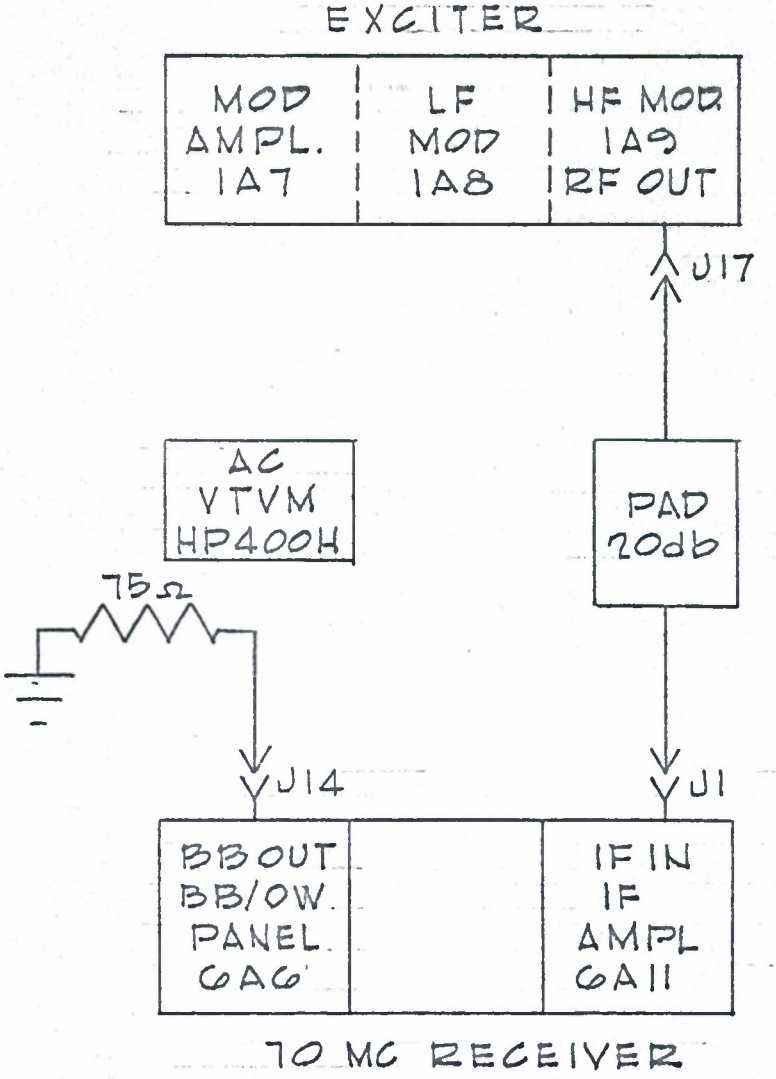


FIGURE-8

FEDERAL ELECTRIC CORPORATION
PARAMUS, NEW JERSEY
SERVICE PARAMUS INDUSTRIAL PARK
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

F. BECK 3-10-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 50

GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

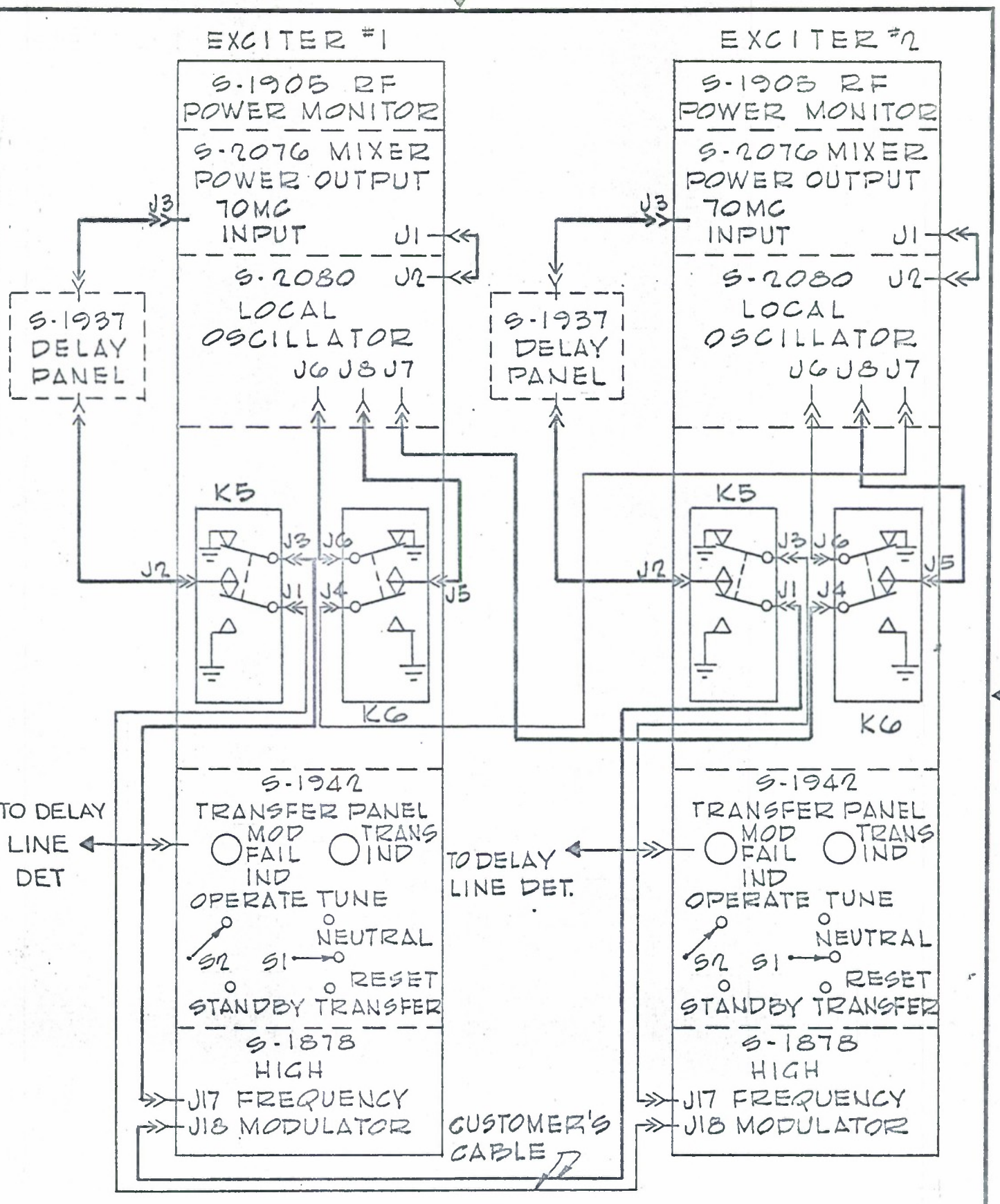


FIGURE -9

FEDERAL ELECTRIC CORPORATION
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY

DRAWING NUMBER 6272879 SH 51

F. BECK 3-10-64
PREPARED BY DATE

CHECKED BY DATE

CODE IDENT. NO. 14842

DWG. SIZE A

6272879 A

FEC NO.

SHEET 51

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

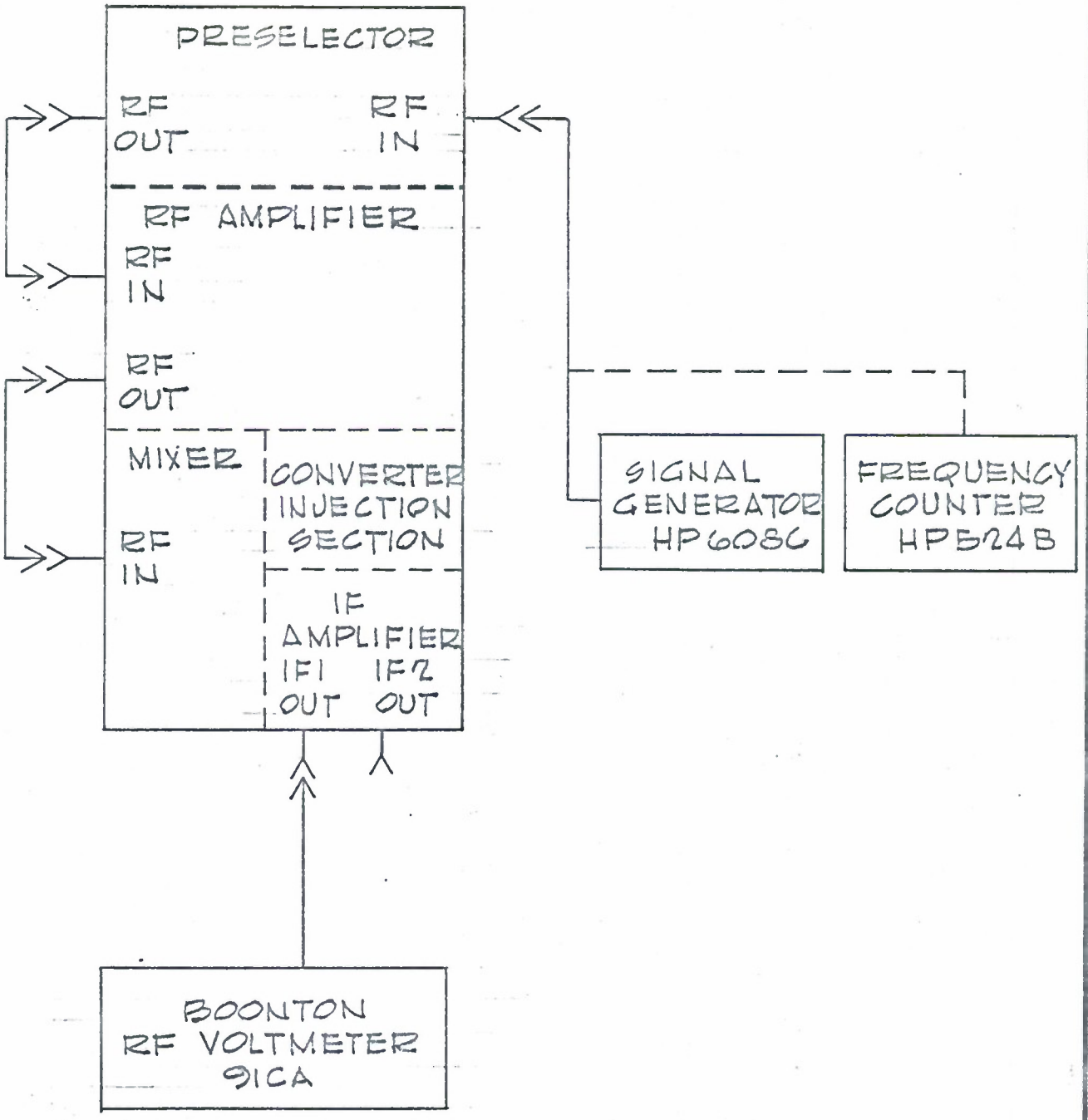


FIGURE 10

DRAWING NUMBER 6272879

FEDERAL ELECTRIC CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

F. BECK 3-10-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. A SIZE	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 52

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

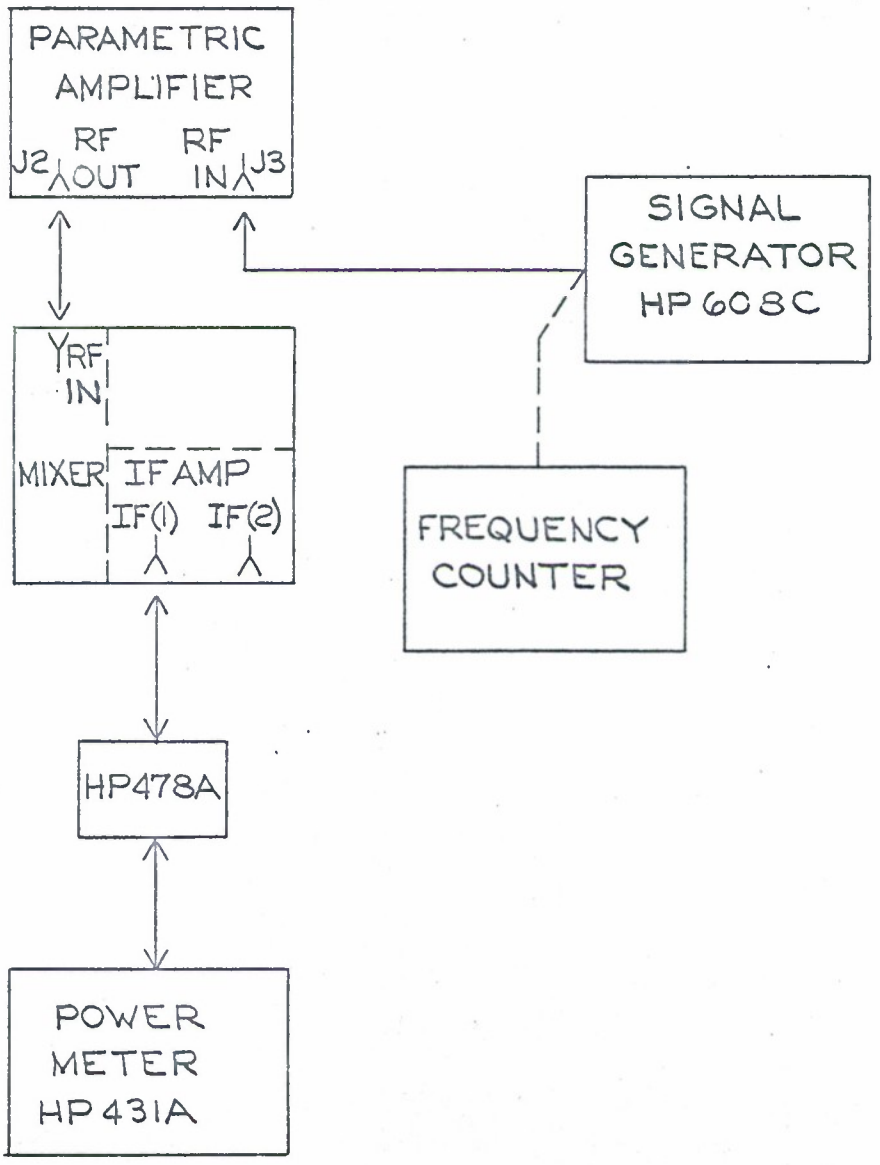


FIGURE - 11

PREPARED BY D. MOLZON	DATE 3-13-64	CODE IDENT. NO. 14842	DWG. A SIZE 6272879 A
CHECKED BY	DATE 3/26/64	FEC NO.	SHEET 53

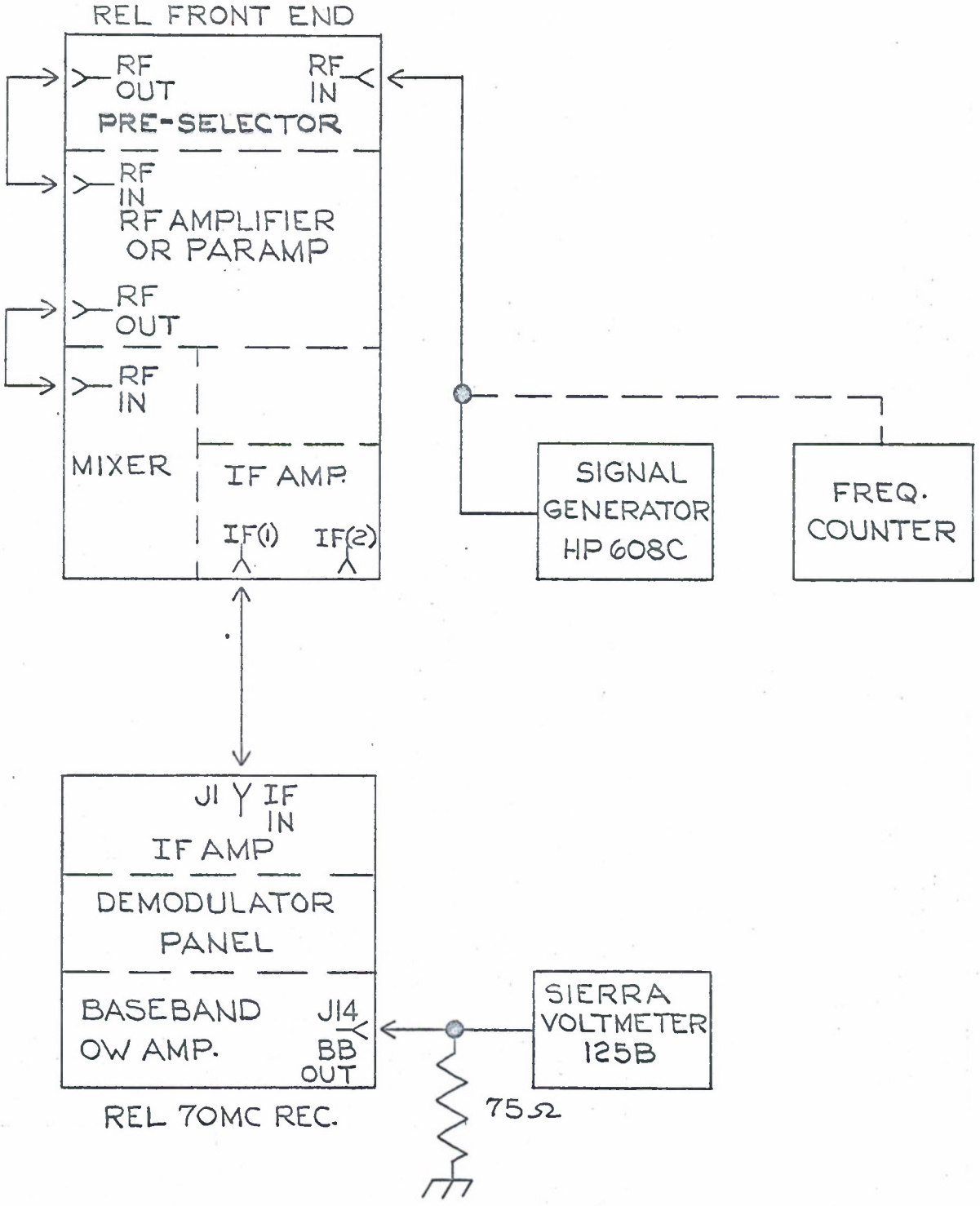


FIGURE -12

PREPARED BY D. MOLZON DATE 3-13-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE 3/16/64		FEC NO.	SHEET 52

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

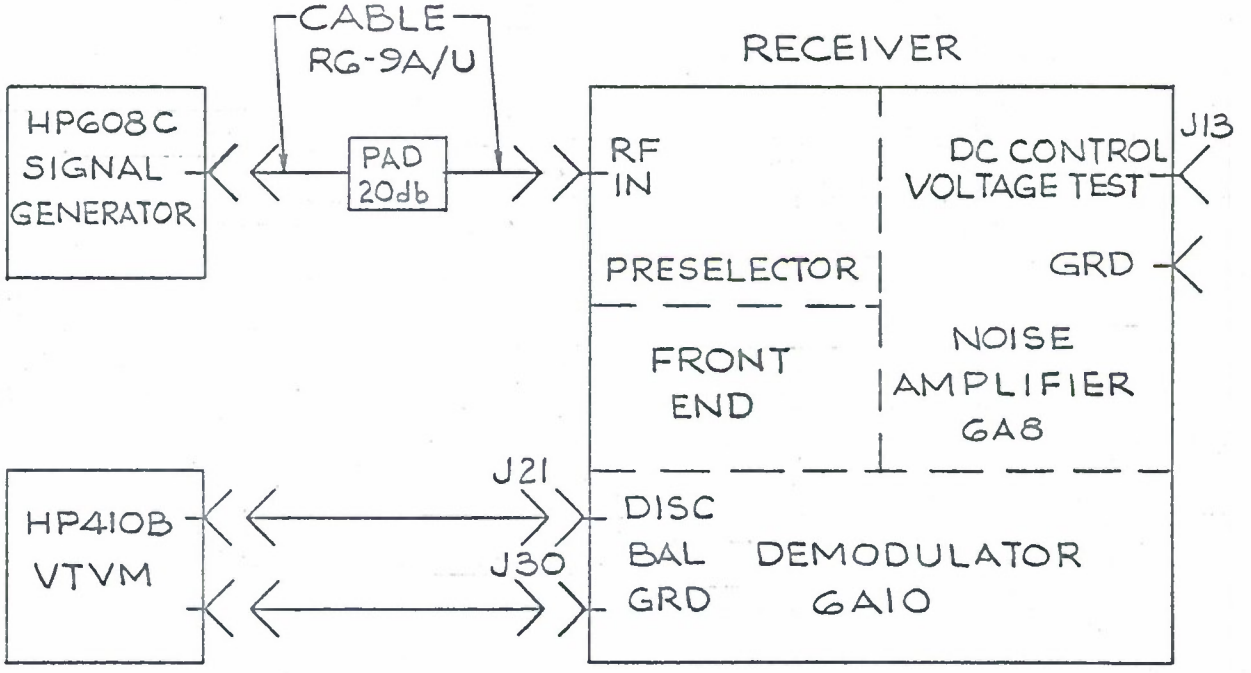


FIGURE-13

FEDERAL ELECTRIC CORPORATION
INDUSTRIAL PARK, PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

DRAWING NUMBER 6272879

PREPARED BY L. DeYoung DATE 3-16-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY H. Edwards DATE 3/16/64		FEC NO.	SHEET 53

QUILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

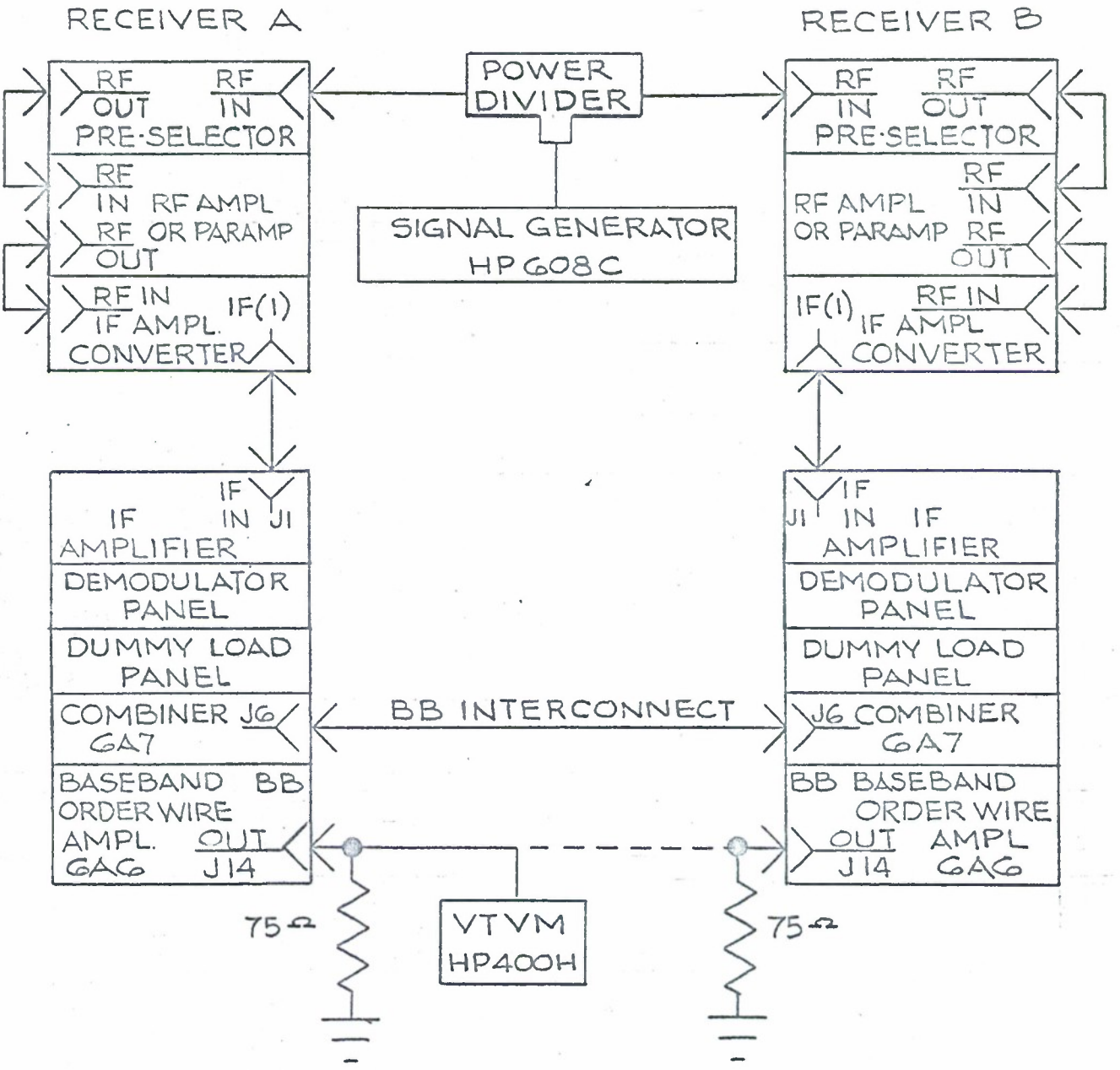


FIGURE 14

FEDERAL ELECTRIC CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

DRAWING NUMBER 6272879 56

PREPARED BY	DATE	CODE IDENT. NO.	DWG.	
[illegible]	3-16-64	14842	A SIZE	6272879 A
CHECKED BY	DATE		FEC NO.	SHEET 56

GILVIS PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

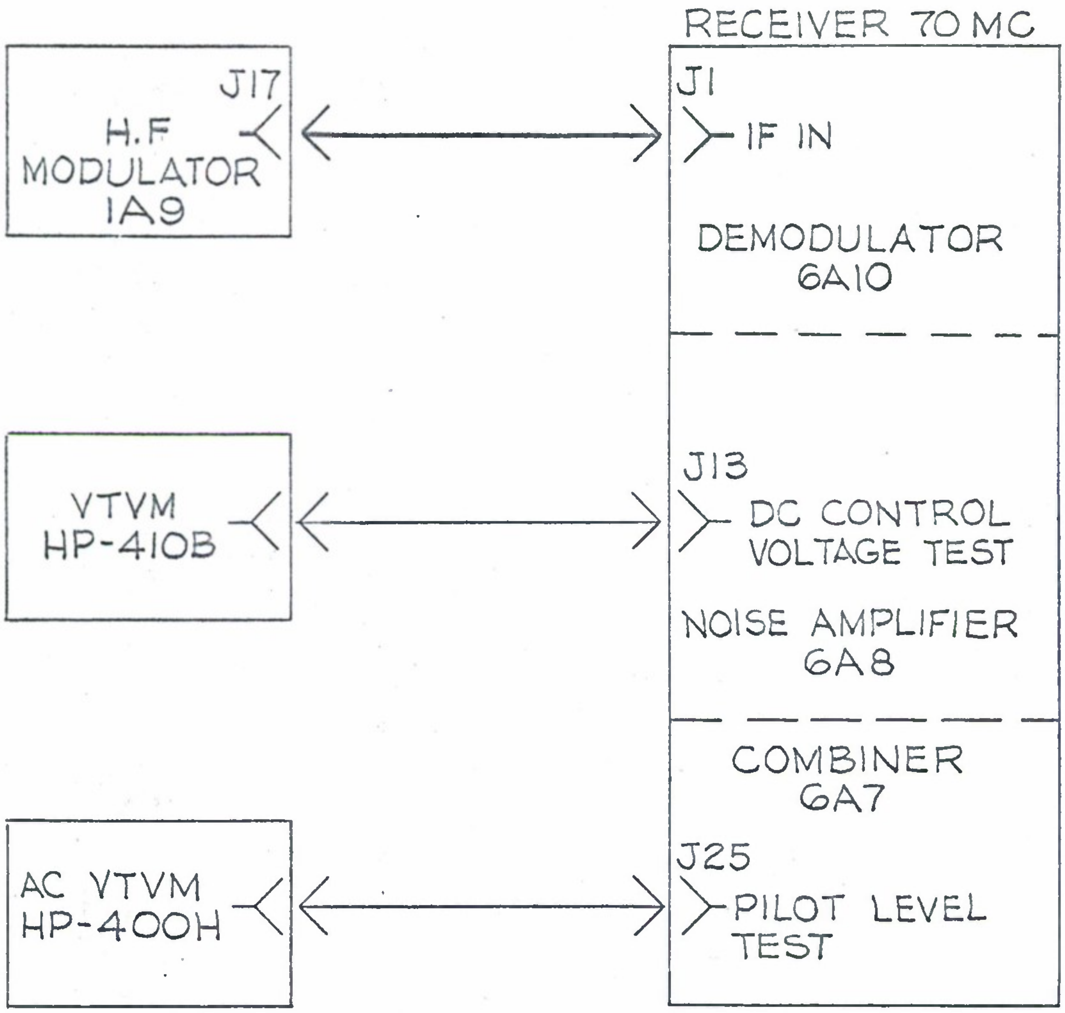


FIGURE 15

FEE-2A (E)

FEDERAL ELECTRIC CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK, PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

V Bowhler 3-12-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879	A
S. Calenster 3/16/64 CHECKED BY DATE		FEC NO.	SHEET 57	

SILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

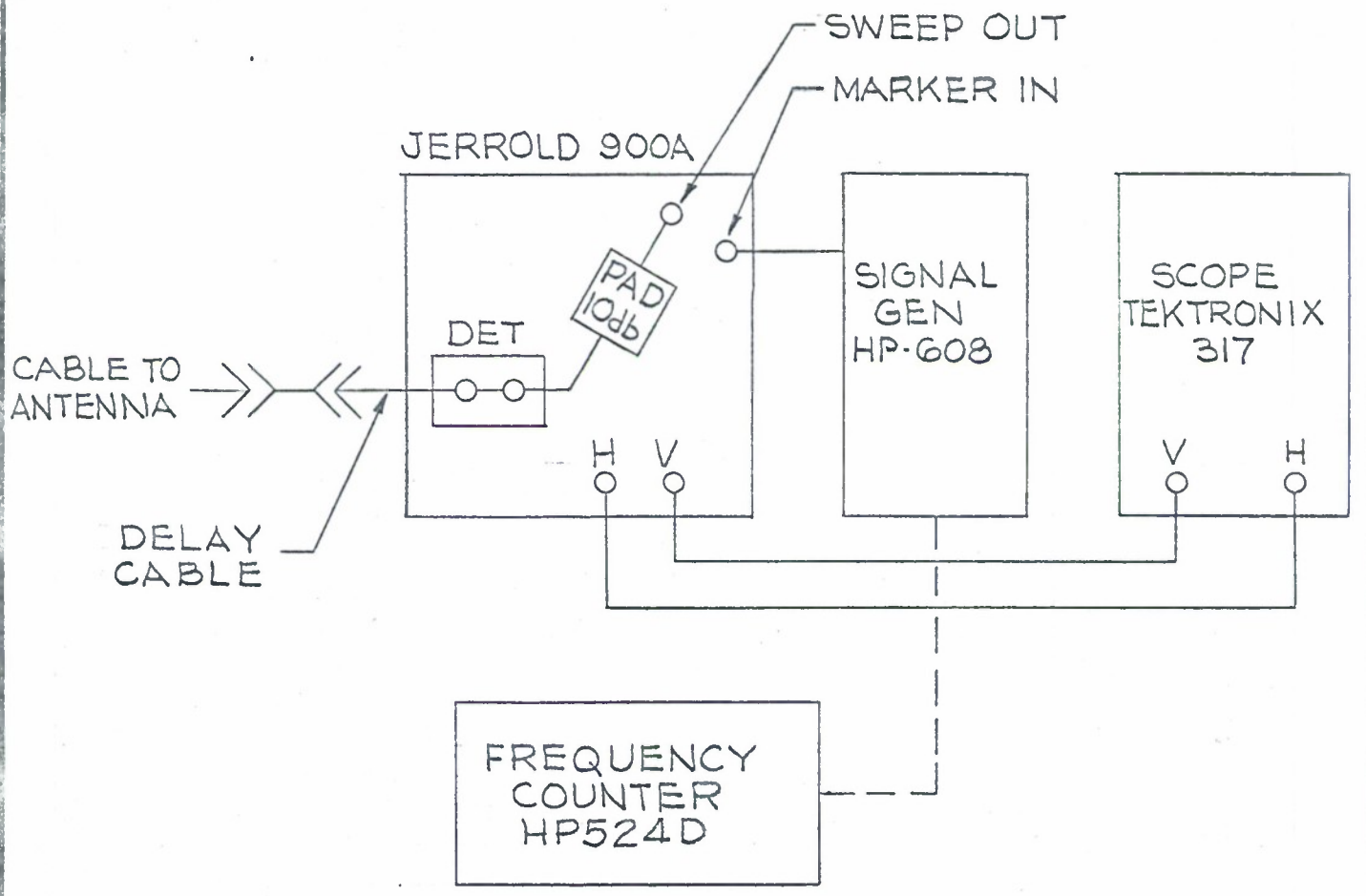


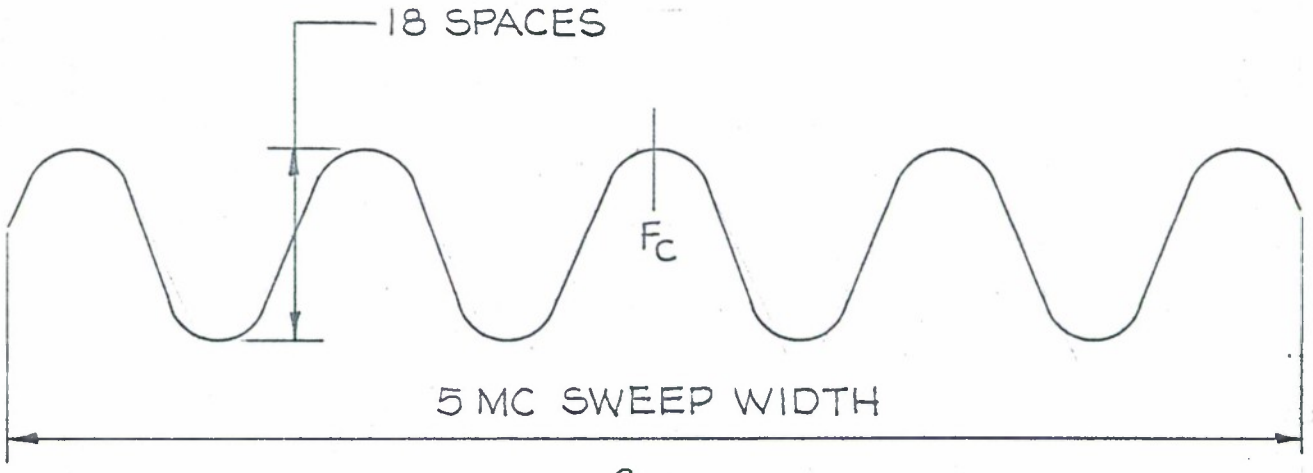
FIGURE 16

FEDERAL ELECTRIC CORPORATION
SERVICE PATAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

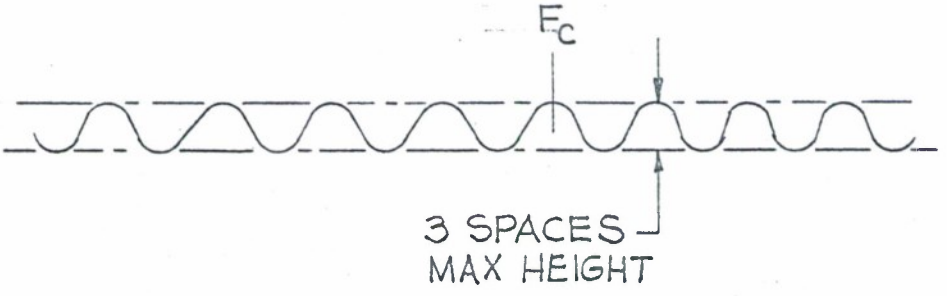
DRAWING NUMBER 6272879

V Bawbles 3-12-64	CODE IDENT. NO. 14842	DWG. A	6272879 A
PREPARED BY / DATE 3/16/64		SIZE	
CHECKED BY / DATE		FEC NO.	SHEET 53

GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M



a.



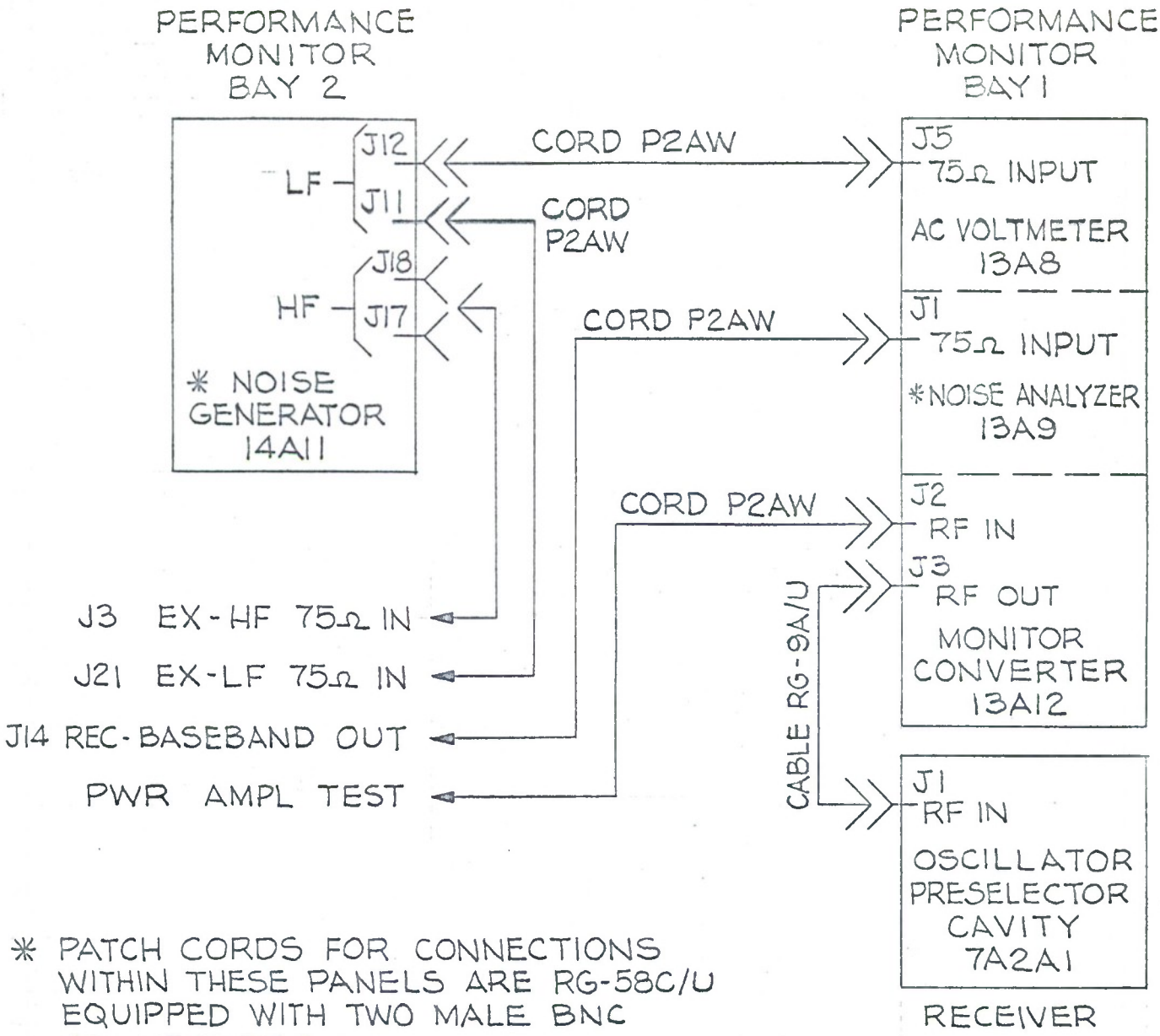
b.

FIGURE 17

a. DELAY CABLE UNTERMINATED
b. DELAY CABLE TERMINATED

V Bowblis 3-13-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 57

GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M



* PATCH CORDS FOR CONNECTIONS WITHIN THESE PANELS ARE RG-58C/U EQUIPPED WITH TWO MALE BNC CONNECTORS

FIGURE 18

DRAWING NUMBER 6272879 (60)

FEDERAL ELECTRIC CORPORATION
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
SERVICE

V Bowlis 3-13-64 PREPARED BY / DATE	CODE IDENT. NO. 14842	DWG. A SIZE	6272879 A
CHECKED BY / DATE		FEC NO.	SHEET 60

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

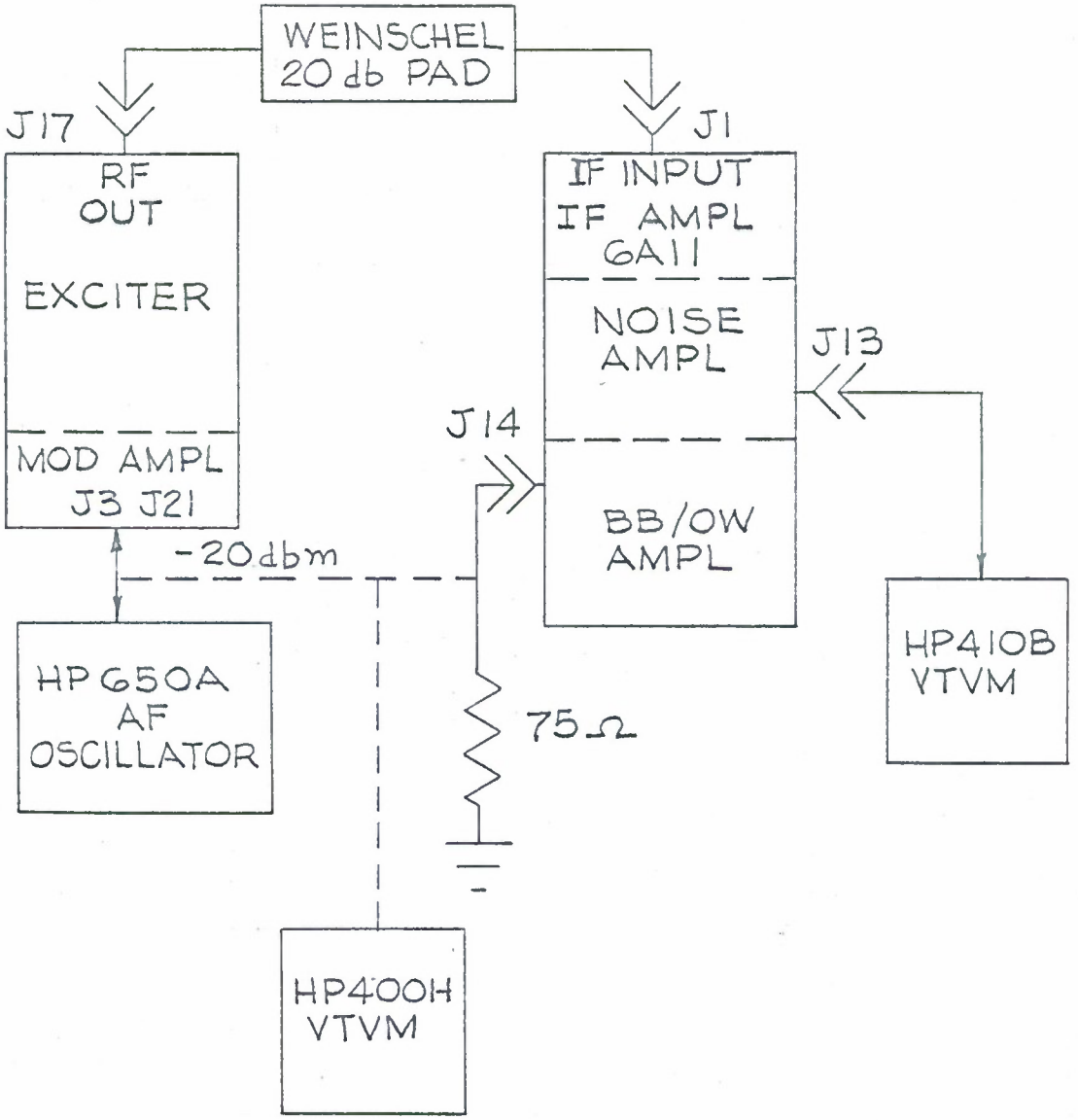


FIGURE 19

FEDERAL ELECTRIC CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

DRAWING NUMBER 6272879 A1

V Bambis 3-12-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
D. Richards 3/16/64 CHECKED BY DATE		FEC NO.	SHEET 61

PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

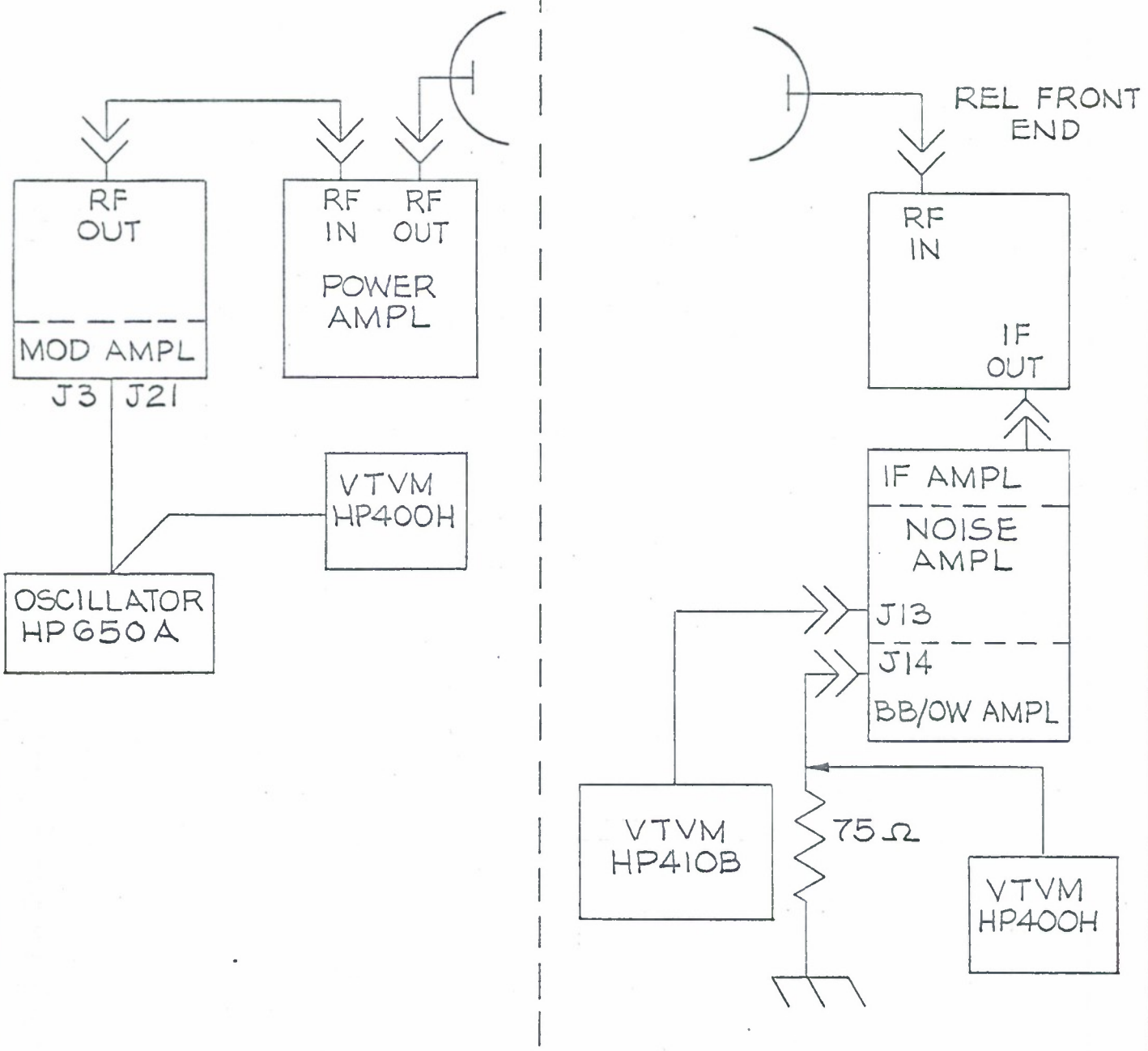


FIGURE 20

V Bacolitis 3-13-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 62

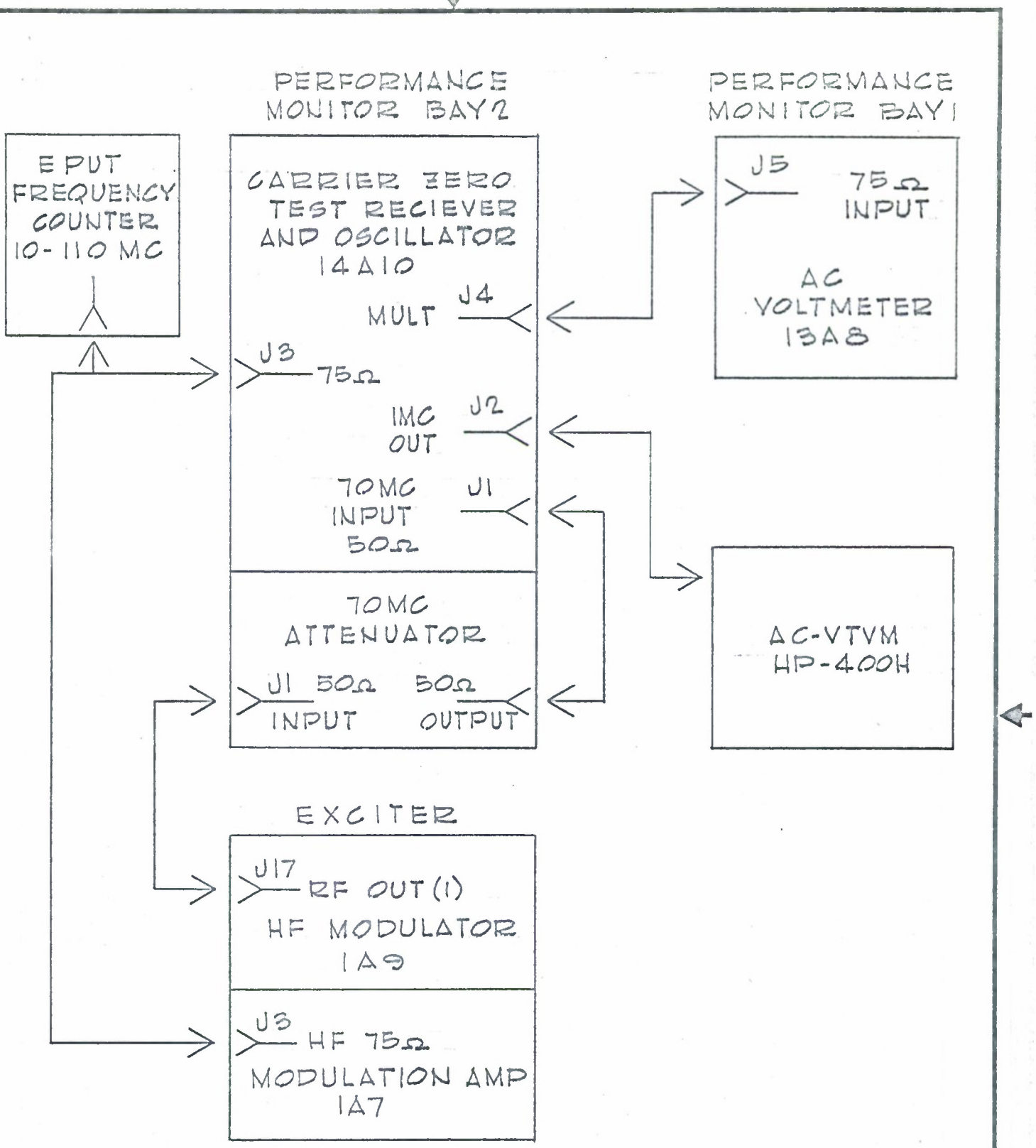


FIGURE 25

F. BECK 3-10-64
PREPARED BY DATE
CHECKED BY DATE

CODE IDENT. NO. 14842
DWG. SIZE A
6272879 A
FEC NO.
SHEET 63

SELVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

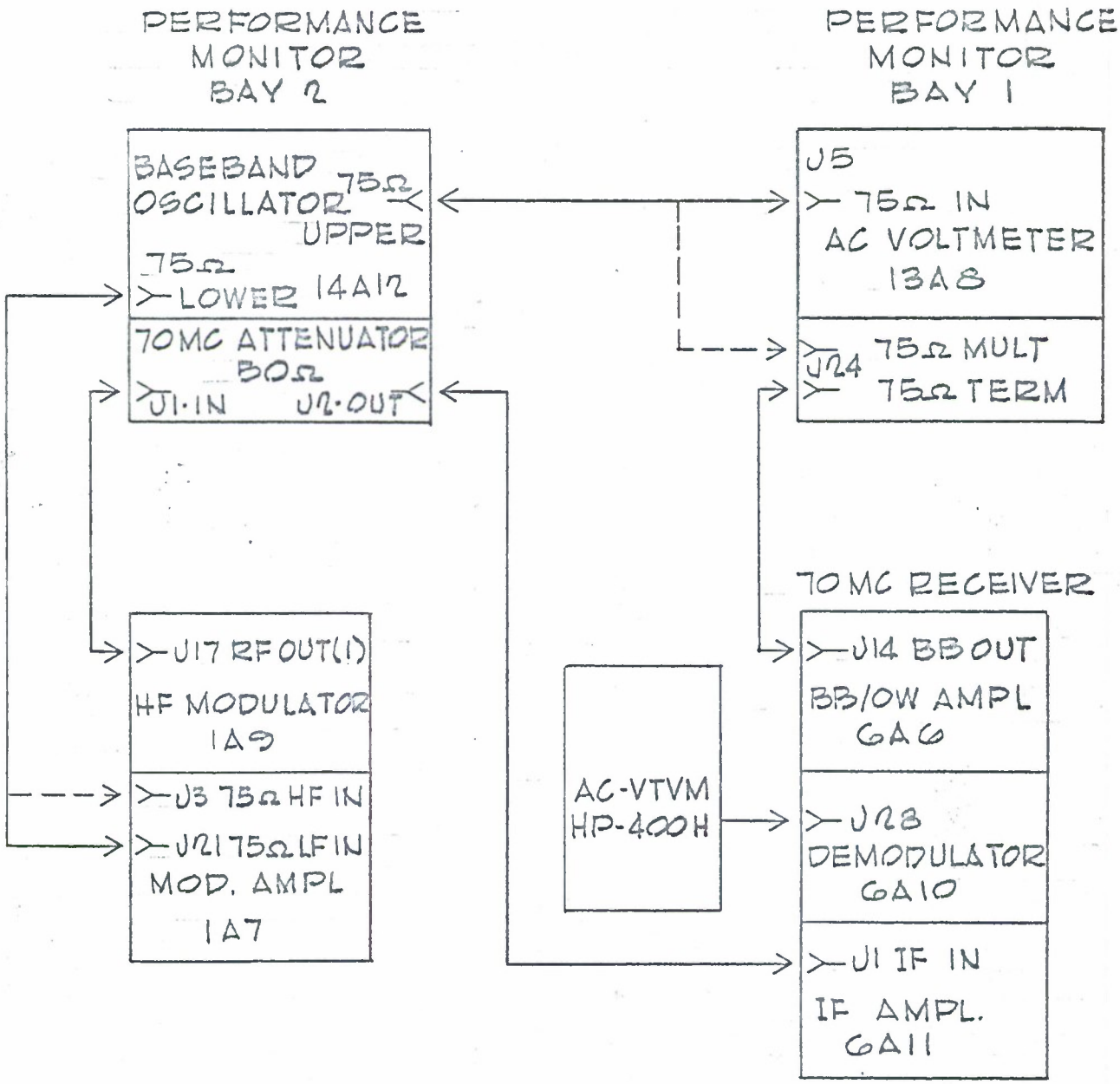


FIGURE 26

FEDERAL ELECTRIC CORPORATION
PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION
SERVICE

F. BECK 3-10-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 6-9

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

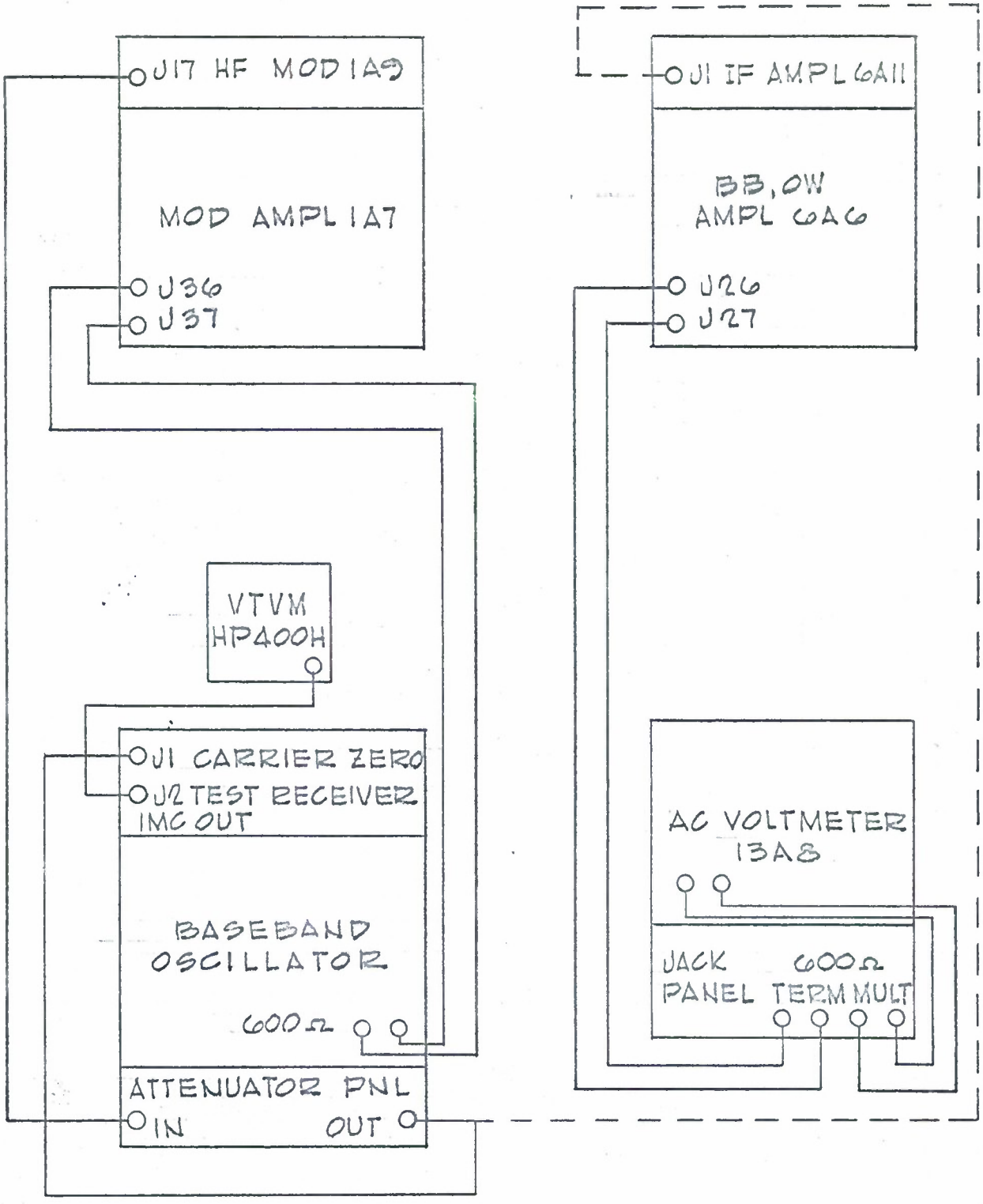


FIGURE 27

F. BECK 3-10-64 PREPARED BY DATE	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
CHECKED BY DATE		FEC NO.	SHEET 65

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

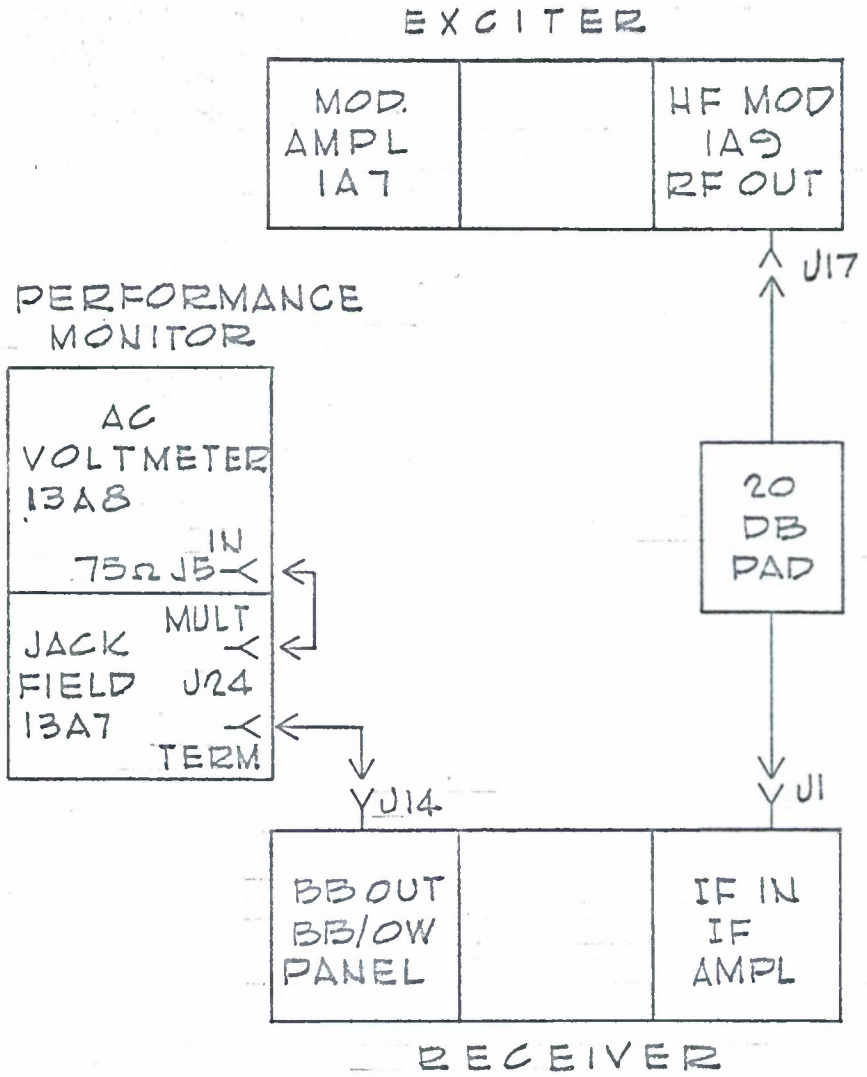


FIGURE 28

F. BECK 3-10-64	CODE IDENT. NO. 14842	DWG. SIZE A	6272879 A
PREPARED BY / DATE			
CHECKED BY / DATE		FEC NO.	SHEET 66

GILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

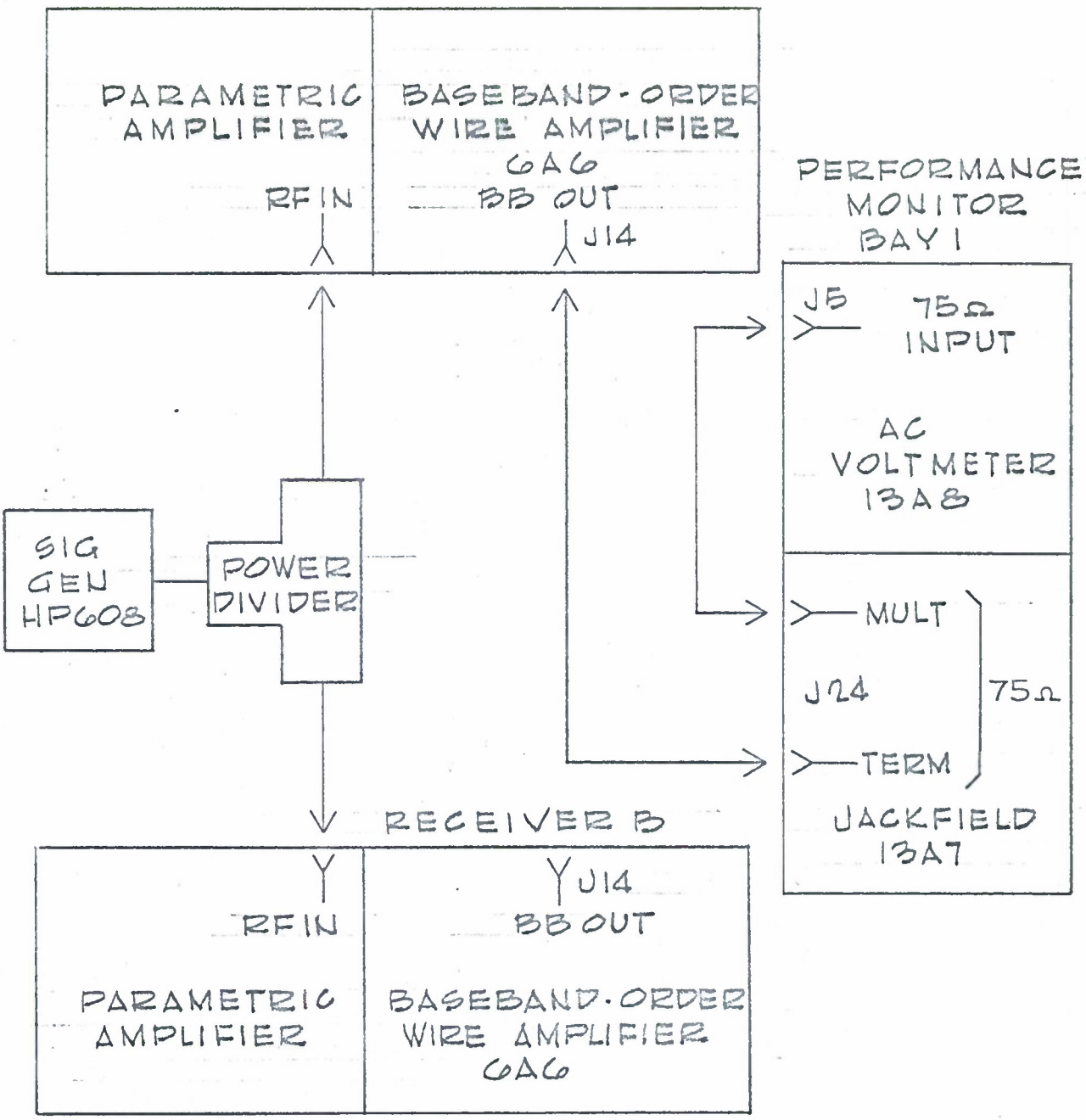


FIGURE 29

FEDERAL ELECTRIC CORPORATION
PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

DRAWING NUMBER 6272879 67

TITLE SERVICE	F. BECK 3-10-64 PREPARED BY / DATE; CHECKED BY / DATE	CODE IDENT. NO. 14842	DWG. SIZE A — 6272879 A
		FEC NO.	SHEET 67

SILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

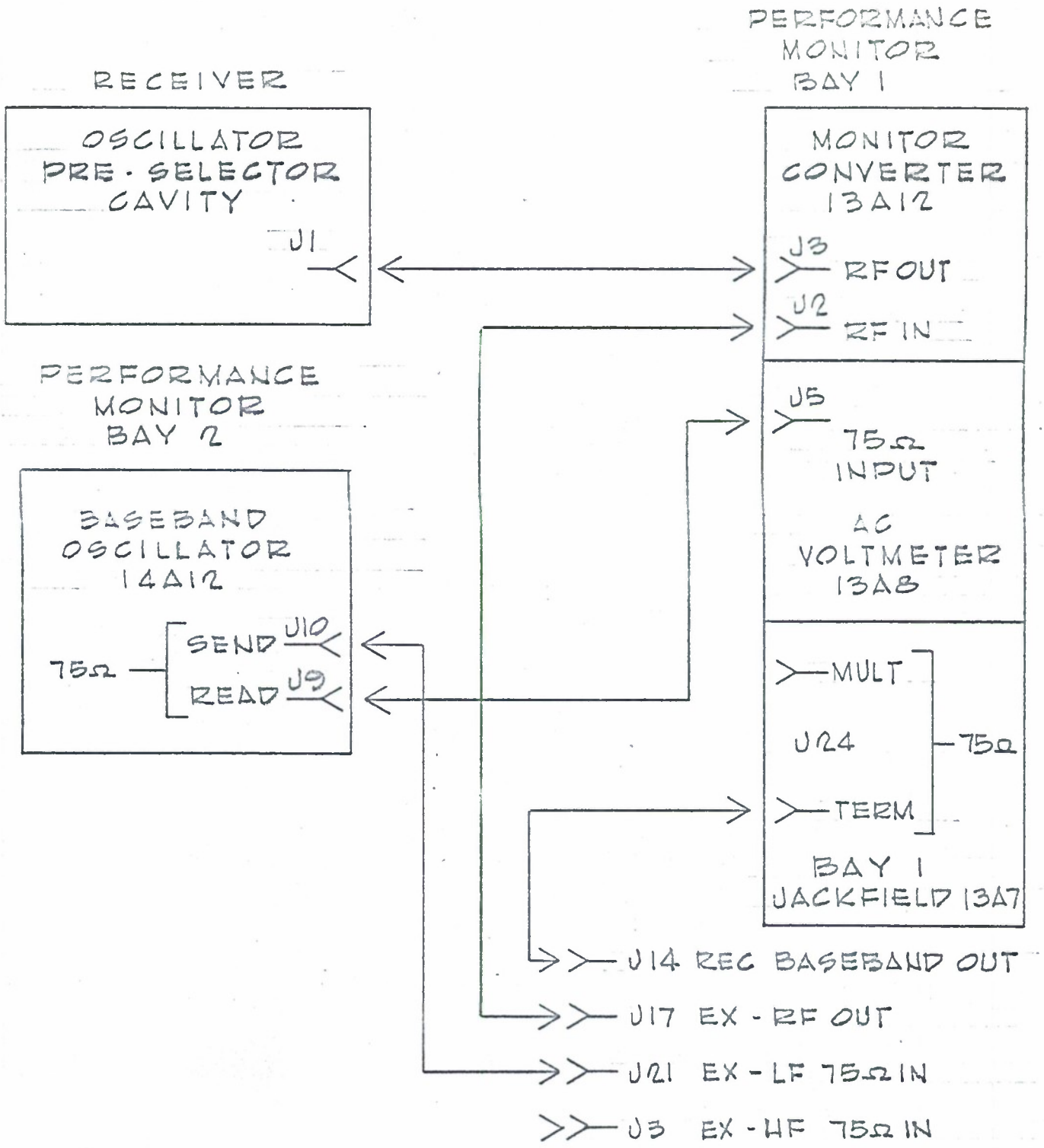


FIGURE 30

FEDERAL ELECTRIC CORPORATION
PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

DRAWING NUMBER 6272879

F. BECK 3-10-64
PREPARED BY DATE
CHECKED BY DATE

CODE IDENT. NO. 14842
DWG. SIZE A
6272879
FEC NO.
SHEET 65

GILVIE PRESS, INC., BROOKLYN 17, N.Y. REPROVEL NO. 400M

FEE-2A (P)

DWG NO. 6272894 [illegible]

A ORIGINAL ISSUE	REVISIONS		
SYM	ZONE	DESCRIPTION	DATE	APPROVED

SHEET NO.	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A									
SHEET NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ISSUE LTR	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

GROUP		NEXT ASSEMBLY	FIRST USED ON
G			
G			
G			
G			
G			
G1		6272925	
		APPLICATION	

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES

COML. TOL. APPLY TO STOCK SIZES

APPROVALS SIGNATURE & DATE	
DRAWN	
CHECKED	MR 3/23/64
MECH	
ELECT	
STDS	D. Palmateer 3/23/64

FEC: H. Elliott 4-8-64 — FEC SOURCE

OTHER

SERVICE

FEDERAL ELECTRIC CORPORATION
PARAMUS INDUSTRIAL PARK — PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

TEST PROCEDURES
RADIO SET AN/FRC-39
BIG RALLY II COMMUNICATIONS SYSTEM

CODE IDENT. NO.	DWG.	
14842	A SIZE	6272894
SCALE	FEC NO.	SHEET 1 OF 41

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

FEDERAL ELECTRIC CORPORATION
SERVICE PARAMUS INDUSTRIAL PARK PARAMUS, NEW JERSEY
A SUBSIDIARY OF INTERNATIONAL TELEPHONE AND TELEGRAPH CORPORATION

1. SCOPE

1.1 This section outlines the testing procedures for an AN/FRC-39 Radio Set.

2. TEST EQUIPMENT

2.1 Test equipment required is indicated with each test procedure.

3. TEST CONDITIONS

3.1 The equipment must be properly installed and placed into operation prior to the performance of the test procedures in accordance with manufacturer's manual.

3.2 Testing procedures will be performed on equipment properly installed with all signal and power connections completed.

3.3 Equipment shall be operating with full power in accordance with approved maintenance procedures prior to performing these tests.

3.4 The equipment must be properly aligned prior to the performance of the tests. In case a failure occurs during the test and indicated specification limits cannot be met, the equipment has to be realigned in accordance with manufacturer's manual and the tests have to be repeated.

4. PROCEDURE

4.1 The procedures for performing each test are included within this section.

4.2 The testing procedures shall be completed in the order presented.

5. REQUIREMENTS

5.1 Exciter

5.1.1 Frequency
5.1.2 R. F. Passband
5.1.3 Power Output
5.1.4 Deviation
5.1.5 Order Wire Deviation & Level
5.1.6 Pilot Tone Deviation & Level

5.2 Power Amplifier

5.2.1 Input Power
5.2.2 Output Power
5.2.3 Reflected Power, and VSWR

Test Procedures Radio Set AN/FRC-39	CODE IDENT. NO. 14842	DWG. SIZE A	6272894
PREPARED BY [signature] DATE 3/29/61			
CHECKED BY [signature] DATE 4/7/61		FEC NO.	SHEET 2

OGILVIE PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

5.3 Receiver

5.3.1 Gain
5.3.2 Quieting Sensitivity
5.3.3 Diversity Combiner Action
5.3.4 Pilot Tone Levels
5.3.6 Antenna System VSWR

5.4 AN/FRC-39 Overall Tests

5.4.1 Radio Intermodulation Ratio
5.4.2 Baseband Frequency Response

5.5 AN/FRC - 39 Link Tests

5.5.1 Radio Noise and Spurious Tone Levels
5.5.2 Baseband Frequency Response

6. RECORDING RESULTS

6.1 Test results shall be recorded in triplicate on forms attached.

7. EXCITER TEST PROCEDURES (FORM BRII/71)

7.1 Frequency

7.1.1 Test Equipment

A. Frequency Counter, HP 524D

B. 10 db Pad, Weinschel 50-10

7.1.2 Procedure

A. Make certain that the exciter is properly terminated.

B. Connect the frequency counter to the exciter RF Sample Jack J1 through the 10 db pad.

C. Read and record the frequency indicated on the counter.

7.2 R. F. Passband

7.2.1 Test Equipment

Test Procedures Radio Set AN/FRC-39	CODE IDENT. NO.	DWG.	
PREPARED BY [signature] DATE 3/29/64	14842	A SIZE	6272894
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 3

SILVIA PRESS, INC., BROOKLYN 17, N. Y. REPROVEL NO. 400M

A. Oscilloscope, Tektronix 317

B. Sweep Generator, Kay 860A-50

C. Signal Generator, HP 608C

D. 10 db Pad, Weinschel 50-10

E. 3 db Pad, Weinschel 50-3

7.2.2 Procedure

A. Connect the equipment as shown in Figure 1.

B. Adjust the oscilloscope VERTICAL SENSITIVITY control so that the display occupies eight large vertical divisions.

C. Connect the 3 db coaxial attenuator in series with the output of the sweep generator and note on the oscilloscope the number of vertical divisions the display had dropped. These are the 3 db points of reference. Remove the 3 db coaxial attenuator and recount the sweep generator.

D. Calculate the 1 db point on the oscilloscope grid. If the display drops 2 large divisions or 10 small divisions for the 3 db coaxial attenuator, then the 1 db point is approximately 3 small divisions.

E. Decrease the signal generator frequency by varying the FREQUENCY control until the marker rests at the 1 db point calculated in Step D. Record the frequency reading on the signal generator.

F. Increase the signal generator frequency by varying the FREQUENCY control until the marker again rests at the 1 db point calculated in Step D. Record this frequency. Subtract the frequency reading obtained in Step E from that in Step F. Record the difference frequency. The response should be symmetrical around the 70 mc center frequency.

7.3 Power Output

7.3.1 Test Equipment not required.

7.3.2 Read and record the power output on the Power Monitor

Test Procedures Radio Set AN/FRC-39	CODE IDENT. NO. 14842	DWG. SIZE A	6272894
PREPARED BY [signature] DATE 3/24/64			
CHECKED BY [signature] DATE 4/7/64		FEC NO.	SHEET 4

7.4 Exciter HF Modulator Deviation

7.4.1 Test Equipment

A. Frequency Counter, HP 524-D

B. Performance Monitor, Bays 1 and 2

C. AC-VTVM HP 400H

7.4.2 Preliminary

A. Transfer modulator out of service

B. Remove input cables to order wire, LF modulator and HF modulator on the modulation amplifier panel 1A7.

C. Disconnect the pilot tone oscillator by removing jumper cable from Radio Pilot Output (2) jack J53 and jack J55.

7.4.3 Procedure

A. Connect equipment as shown in figure 2.

B. With the 20 db button on the 70 MC attenuator 14A6 depressed, turn the FREQUENCY SELECTOR switch on carrier zero test receiver and oscillator 14A10 to 58.216KC.

C. Set ac voltmeter 13A8 to DIRECT or 75 OHM.

D. Short out the pre-emphasis circuit with a short piece of wire between HF PRE EMPHASIS jack J66 to GROUND jack J67 on the modulator amplifier.

E. Remove the patch and cord connected to 75 OHM jack J3 on the carrier zero test receiver and oscillator.

F. With the ac voltmeter on the 10 volt range, adjust OSC FREQUENCY VERNIER C11 on the carrier zero test receiver and oscillator for a maximum reading.

G. Insert the patch cord removed in step E into the 75 OHM jack.

H. Remove the patch cord from 1 MC output jack J2 on the carrier zero test receiver and oscillator and connect the cord to 75 OHM MULT jack J4 on the same panel.

I. With the ac voltmeter monitoring the output level, adjust the carrier zero test receiver and oscillator OUTPUT LEVEL control R35 for a reading of -14 dbm (the SET DEVIATION line) on the ac voltmeter.

J. Connect the HP-400H voltmeter to J2, IMC OUT on the Carrier zero Test Receiver.

K. Adjust MOD SENS ADJ control C8 on the hf modulator panel for a minimum reading on the 400 H voltmeter, increasing the sensitivity of the receiver while adjusting.

L. Turn carrier zero test receiver and oscillator OUTPUT LEVEL ADJ control to minimum and slowly increase the output level until a dropout is seen on the 400H voltmeter.

M. Using the ac voltmeter, measure and record the output level of the carrier zero test receiver and oscillator at the 75 OHM MULT jack J4.

N. Repeat steps A through M for the second exciter.

7.5 L F Modulator Baseband Deviation

7.5.1 Test Equipment

A. Perform Monitor, Bays 1 and 2

B. AC-VTVM, HP 400H

7.5.2 Preliminary

This test will be performed immediately after the HF Deviation Test. Before this test can be performed, the receiver wide band amplifier gain and baseband level must be adjusted. To adjust the demodulator and baseband - order wire amplifier gain, proceed as follows:

A. Remove the cable from WB OUTPUT jack J28 on demodulator 6A10.

B. Connect equipment as shown in figure 3.

C. Turn the selector switches on ac voltmeter 13A8 and on baseband oscillator 14A12 to 75 OHM.

D. Connect a cable between HF PRE-EMPHASIS jack J66 and GRD jack J67 on the modulation amplifier 1A7.

E. Connect baseband oscillator to HF MOD IN jack J3 on modulation amplifier 1A7.

F. Set the baseband oscillator frequency to 64 KC and adjust the output level for -20dbm as measured on the ac voltmeter 13A8.

G. Adjust WB AMPL GAIN ADJUST potentiometer R140 for 12 millivolts on the 400H VTVM.

H. Remove the VTVM and reconnect the cable to WB OUTPUT jack J28 which was disconnected in step A.

I. Remove the cable connected between HF PRE-EMPHASIS jack J66 and GRD jack J67 on the modulation amplifier.

J. Disconnect the ac voltmeter 13A8 from the baseband oscillator and connect it to the 75 OHM MULT jack on bay 1 jackfield 13A7.

K. Adjust BASEBAND LEVEL ADJUST potentiometer R45 on the baseband order wire amplifier to -10 dbm on the ac voltmeter.

L. Initial data sheet BRII/71 when all four receivers have been adjusted as instructed by steps A through K.

M. Proceed with the LF Deviation test using one of the adjusted receivers.

7.5.3 Procedure

A. Remove modulator from service by transfer. (Assure that the Tune - Neutral - Reset switch is in the Tune position on operating the Exciter).

B. Remove modulation inputs from modulation amplifier 1A7.

C. Remove pilot tone output by disconnecting cable between radio output jack J53 and J55.

D. Turn INPUT SELECTOR switch on ac voltmeter 13A8 the OUTPUT SELECTOR switch on baseband oscillator 14A12 to 75 OHM.

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E. Connect equipment as shown in figure 3, with the baseband oscillator connected to J21 of modulation amplifier 1A7.

F. Adjust the baseband oscillator for a frequency of 30 KC and an output level of -20 dbm.

G. Remove the patch cord from the upper 75 OHM jack on the baseband oscillator and insert the cord in the 75 OHM MULT jack on bay 1 jackfield 13A7.

H. Remove the patch cord from MOD(1)INPUT jack J4 on the LF modulator.

I. Adjust the MOD SENS (2) ADJUST control C23 for a reading of -16 dbm on the ac voltmeter.

J. Reconnect the patch cord to the MOD (1) INPUT jack and remove the cord from the MOD (2) INPUT jack.

K. Adjust MOD SENS (1) ADJUST for a reading of -16 dbm on the ac voltmeter. Reconnect MOD (2) input cable.

L. Record the signal level indicated on the ac voltmeter.

M. Repeat steps A through L for the second exciter.

7.6 Exciter Order Wire Deviation and Level Test

7.6.1 Test Equipment

A. Performance Monitor Bays 1 and 2.

B. 2 test cord adapters Special WECO TYPE 241A PLUG to dual RG58/U WITH BNC, WIRED TIPS ONLY.

7.6.2 Preliminary

A. The HF and LF deviation and level test must be performed before proceeding with this test.

B. Remove the modulator from service by transfer (assure that the Tune-Neutral-Reset switch is in the Tune position on the operating exciter).

C. Remove HF and LF modulation inputs from the modulation amplifier.

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D. Remove pilot tone output by disconnecting cable between radio output jack J53 and J55.

7.6.3 Procedure

A. Connect the test equipment as per FIG 4.

B. Adjust the Baseband Oscillator to 13.3KC @ -20 dbm 600 OHM POSITION.

C. Using the carrier Zero Test receiver and the 400H AC voltmeter adjust OW LEVEL ADJ on MOD AMPL 1A7 for a null.

D. With the MOD MON meter switch in position 9, adjust OW MON LEVEL ADJ ON MOD AMP FOR A RED LINE INDICATION.

E. Connect the output of the attenuator panel to J1 IF INPUT of the 6A11 IF amplifier.

F. Adjust the Baseband Oscillator for 1 KC @ -20 dbm 600 OHM POSITION.

G. Connect the 13A8 AC voltmeter to the 600 OHM MULT jack on jackfield 13A7, with the voltmeter in 600 OHM Position.

H. Adjust the OW LEVEL ADJ on the baseband Order Wire amplifier 6A6 for a level of -10 dbm as read on the 13A8 AC VOLTMETER.

I. Record the reading.

J. Repeat steps A through I for the second exciter.

7.7 Pilot Tone Level and Deviation

7.7.1 Test Equipment

A. AC VTVM, HP 400H.

B. Performance Monitor, Bay 1

7.7.2 Preliminary

A. The LF Modulator deviation test must be performed before proceeding with this test.

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B. Disconnect the low frequency, high frequency and order wire modulation inputs to modulation amplifier 1A7. Set the Tune-Neutral-Reset switch so that transfer does not occur. Pilot Tone generator will remain connected for this test.

7.7.3 **Procedure**

A. Set RADIO PILOT LEVEL (1) on modulator amplifier fully clockwise.

B. Connect HP-400H to RADIO PILOT LEVEL, (1) Jack J51 on the modulator amplifier.

C. Record Pilot Tone Level.

D. Connect the test equipment as per figure 5.

E. Disconnect the input to the LF input J21 on Mod AMPL 1A7.

F. Connect the pilot between J53 and J55 on MOD AMPL 1A7.

G. Disconnect HF MOD input to HF Modulator 1A9.

H. Adjust RADIO PILOT LF LVL ADJ on MOD AMPL 1A7 for a reading of -24 dbm on the AC VOLTMETER 13A8.

I. Reconnect the HF MOD input to the HF Modulator and disconnect both LF inputs to the LF Modulator 1A8.

J. Adjust the RADIO PILOT HF LVL ADJ on the MOD AMPL 1A7 for a reading of -24 dbm on the 13A8 VOLTMETER.

K. Reconnect both of the LF INPUTS to the LF MOD 1A8.

L. The reading on the voltmeter 13A8 should be -20 dbm. If it is slightly off, readjust both the RADIO PILOT HF AND LF ADJ equally for a reading of -20 dbm.

M. Record the reading.

7.8 Dual Modulator Operation

7.8.1 Test Equipment not required

7.8.2 Procedure

NOTE: Perform this procedure after all Deviation (HF, LF, OW and Radio Pilot) and Mixer Power Output Panel Alignment have been completed.

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A. Interconnect exciters as shown in Figure 6.

B. Place the Tune - Reset - Transfer switch (located on the Transfer Panel) of both exciters to Neutral position.

C. Place Operate - Standby Switch (located on the Transfer Panel) of Exciter 1 to operate position and on Exciter 2 to Standby position.

D. Remove the RF Cable from J17 on the High-Frequency Modulator (S-1878) on Exciter 1.

E. Observe that transfer takes place; the modulator of Exciter 2 is driving the RF amplifier sections of Exciters 1 and 2. The RF output power from both exciters should remain relatively constant. Transfer indicator DS 1 on S-1942 of Exciters 1 and 2 becomes illuminated. Mod. fail indicator DS 2 on Transfer Panel S-1942 of Exciters 1 and 2 will flash momentarily during the transfer time. Illumination of the transfer lamps indicates transfer due to an RF failure.

F. Reconnect the RF Cable to J17 on the High Frequency Modulator (S-1878) on Exciter 1. Momentarily place Tune-Reset.- Transfer switch on S-1942 on either exciter in reset transfer position. Both exciters will return to normal operation and transfer indicator DS 1 on S-1942 will extinguish.

G. Remove the modulation cable 1 W13 from J5 on High Frequency Modulator Panel S-1878 of Exciter 1. Observe that transfer indicator DS 1 on S-1942 of exciters 1 and 2 becomes illuminated. Mod. fail indicator DS 2 on S-1942 of Exciter 1 and 2 will flash momentarily during the transfer time. Reconnect the modulation cable to J 5 on S-1878 and momentarily place the Tune - Reset - Transfer switch in the reset transfer position. The transfer indicators will become extinguished.

H. Repeat steps D through G with Exciter 2 acting as the operate exciter and Exciter 1 acting as the standby exciter.

I. Initial data sheet.

NOTE: In the event that any of the above mentioned operations do not perform normally, proceed to testing the Exciter Transfer Panel.

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8. POWER AMPLIFIER TEST PROCEDURES (FORM BRII/72)

8.1 Input Power

8.1.1 Test Equipment not required.

8.1.2 Read and record INPUT FORWARD meter.

8.2 Output Power

8.2.1 Test Equipment not required.

8.2.2 Read and record OUTPUT FORWARD meter.

8.3 Reflected Power and VSWR

8.3.1 Test Equipment not required.

8.3.2 Read and record OUTPUT BACK meter.

8.3.3 VSWR Calculation

A. Calculation of VSWR from a ratio of forward and reflected power can be made by using the following formula:

$$\text{VSWR} = \frac{\sqrt{P_f / P_r} + 1}{\sqrt{P_f / P_r} - 1}$$

where, P_f Forward power in watts

P_r Reflected power in watts

B. Using the power readings obtained in sections 8.2.2 and 8.2.3 above, record the VSWR as determined from the following table. It is required that VSWR be recorded to three significant figures. Therefore, the power ratio which is calculated should be equated to the nearest power ratio shown on the chart. This will give the required VSWR figure.

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CONVERSION TABLE I

POWER RATIO TO VSWR

P_f/P_r	VSWR	P_f/P_r	VSWR	P_f/P_r	VSWR	P_f/P_r	VSWR	P_f/P_r	VSWR
---	1.00	441	1.10	121	1.20	59	1.30	36	1.40
39601	1.01	367	1.11	110	1.21	56	1.31	34	1.41
9801	1.02	312	1.12	102	1.22	53	1.32	33	1.42
4624	1.03	268	1.13	94	1.23	50	1.33	32	1.43
2601	1.04	233	1.14	87	1.24	47	1.34	31	1.44
1681	1.05	205	1.15	81	1.25	45	1.35	30	1.45
1183	1.06	182	1.16	75	1.26	43	1.36	29	1.46
876	1.07	162	1.17	70	1.27	41	1.37	28	1.47
676	1.08	146	1.18	66	1.28	39	1.38	27	1.48
538	1.09	132	1.19	62	1.29	37	1.39	26	1.49

Example: If forward power is 10KW and reflected power is 125 watts, then the power ratio is $P_f/P_r = \frac{10,000}{125} = 80$. Converting this ratio to the nearest ratio on the chart shows that the VSWR is approximately 1.25. Since the VSWR is required to three significant figures, the value of 1.25 should be used for a ratio of 80.

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8.4 Fault Recycling

8.4.1 Test Equipment not required.

8.4.2 Procedure

A. Set the AUTOMATIC-NORMAL-RESET switch on ac control panel 3A3 to AUTOMATIC.

B. Throw the MAIN POWER circuit breaker on distribution panel 3A2 to OFF; within 2.5 seconds, throw the circuit breaker back to ON.

C. Observe that the BEAM VOLTS METER on meter panel 3A4 drops to zero and then automatically returns to its previous indication.

D. Adjust the red pointer of the BODY CURRENT meter on the meter panel so that it contacts the black indicating pointer, then return the red pointer to its previous position. The black pointer will remain in contact with the red pointer.

E. Observe that the BEAM VOLTS meter drops to zero and automatically returns to its previous position and that the black pointer of the BODY CURRENT meter is automatically separated from the red pointer.

F. Adjust the red pointer of the OUTPUT FORWARD meter on the Klystron carriage 3A1 so that it makes contact with the black pointer, then return the red pointer to its previous position. The black pointer will remain in contact with the red pointer.

G. Set the AUTOMATIC-NORMAL-RESET switch to RESET and then to AUTOMATIC.

H. Observe that the black pointer of OUTPUT FORWARD meter is released from the red pointer and returns to its previous indication.

I. Initial data sheet if fault cycling operates properly.

8.5 Klystron Coolant Flow Rate

8.5.1 Test Equipment not required.

8.5.2 Read and record indication on KLYSTRON COOLANT FLOW meter.

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9. RECEIVER TEST PROCEDURES (FORM BRII/73)

9.1 Receiver Gain (Parametric Amplfier and Converter)

9.1.1 Test Equipment

A. UHF Signal Generator, HP 612A

B. Frequency Counter, HP 524D

C. Power Meter, HP 431A

D. Thermistor Mount, HP 478A

9.1.2 Procedure

A. Connect the equipment as shown in Figure 7.

B. Set signal generator to the receiver frequency using the frequency counter.

C. Set signal generator to a level of -40 dbm.

D. With the power meter connected to IF through the thermistor mount, a power gain of at least 33 db should be indicated.

E. Measure and record output level.

9.2 Receiver Sensitivity (Paramp and Converter)

9.2.1 Test Equipment

A. Signal Generator, HP 612A

B. Frequency Counter, HP 524D

C. Voltmeter, Sierra 125A

9.2.2 Procedure

A. Connect the equipment as shown in Figure 8.

B. Set the HP 612 Signal generator tuning control to the receiver frequency.

C. Turn the signal generator selector switch to CW and adjust the signal generator output control to zero.

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D. Record the receiver noise output shown on the Sierra 125A voltmeter tuned to 30 KC.

E. Adjust the signal generator output control until the noise reading on the 125A decreases 20 db.

F. Record the reading in microvolts on the signal generator output control.

NOTE: The reading in step F must be divided by 10, because of the 20 db pad inserted in the test setup.

9.3 DC Control Voltage

9.3.1 Test Equipment

A. UHF Signal Generator, HP 612A.

B. VTVM, HP 410B

C. 20 db Pad, Weinschel 50-20

9.3.2 Procedure

A. Connect equipment as shown in Figure 9.

B. Set signal generator frequency control on UHF signal generator to receiver frequency.

C. Adjust frequency control on signal generator to obtain zero voltage reading at DISC BAL jack J21 on demodulator, as observed on the AC-DC VTVM.

D. From the HP 612A generator send a -99 dbm (2.5 MV) signal into the receiver preselector filter.

E. Connect the AC-DC VTVM to DC CONTROL VOLTAGE TEST JACK J13 on the noise amplifier.

F. Record the voltage level on the data sheet.

9.4 Baseband Diversity Combiner Action

9.4.1 Test Equipment

A. Performance Monitor

B. Signal Generator, HP 612-A

C. Capacitor 4 to 8 microfarad, 400 volt.

9.4.2 Procedure

A. Connect the equipment as shown in figure 10.

B. Connect a 4 to 8 microfarad, 400 volt capacitor between noise amplifier panel 6A8 DC CONTROL VOLTAGE Jack J13 and ground.

C. Set the signal generator to the receiver frequency.

D. Adjust the signal generator tuning control to obtain zero. voltage on the VTVM connected at DISC BAL jack J21 on the demodulator of either receiver.

E. Remove the cable from BASEBAND COMBINER INTERCONNECTION jack J6 from both receivers.

F. Turn the signal generator selector switch to CW.

G. Adjust the signal generator output control for minimum output.

H. Connect cable assembly RG58C/U between 75 OHM TERM jack J24 on the performance monitor bay 1 jackfield and BASEBAND OUTPUT jack J14 on baseband order wire amplifier 6A6 of receiver A.

I. Measure the baseband noise output of receiver A using AC voltmeter 13A8 in the performance monitor. Record the noise level.

J. Disconnect the cable assembly from BASEBAND OUTPUT jack J14, receiver A, and connect it to BASEBAND OUTPUT jack J14, on baseband-order wire amplifier 6A6 of receiver B.

K. Measure and record the baseband noise output of receiver B using the AC voltmeter in the performance monitor. The noise output of receiver B should be within $\pm$ 2 db of receiver A.

L. Adjust the signal generator output until the baseband noise output of either receiver is reduced 30 db.

M. Connect an RG-58 cable assembly equipped with two BNC male connectors between BASEBAND COMBINER INTERCONNECTION Jack J6 on combiner panel 6A7 of each receiver.

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N. Measure and record the baseband noise output of each receiver. Requirement: 1.5 to 4.5 db less than that recorded in steps I and K respectively.

O. Remove the RF input cable between the power divider and Receiver A. Terminate the open side of the power divider with 50 ohms. The noise output should assume the value measured in Step K, Receiver B.

P. Reconnect the power divider and Receiver A and disconnect Receiver B from the power divider. Terminate the power divider as in Step N. The noise output should assume the value measured in Step K, Receiver A.

9.5 Receiver Pilot Tone

9.5.1 Test Equipment

A. AC-VTVM, HP 400H

B. AC/DC-VTVM, HP 410B

C. Performance Monitor

9.5.2 Procedure

A. Connect patch cord 6W9 between RADIO PILOT INPUT jack J55 and RADIO PILOT OUTPUT (2) jack J53 on modulation amplifier 14A7.

B. Connect equipment as shown in Figure 11.

C. Set the voltmeter for 100 volt range and connect the AC VTVM between PILOT LEVEL TEST Jack J25 and GRD Jack J35 on combiner panel 6A7.

D. Set the PILOT DEFEAT switch on the combiner to OFF and observe that PILOT DEFEAT indicator lamp DSI goes out.

E. Adjust PILOT TONE LEVEL ADJ control R58 on the combiner for reading of 11 volts on the AC VTVM.

F. Adjust PILOT BIAS ADJ R90 on combiner until RADIO PILOT fault indicator lamp DS4 on receiver control panel 6A9 goes on.

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G. Readjust the PILOT TONE LEVEL ADJ control on the combiner for a reading 12.35 volts on the AC VTVM and observe that RADIO PILOT fault indicator lamp goes out.

H. Readjust the PILOT TONE LEVEL ADJ for a reading of 15.5 volts on the AC VTVM.

I. Remove the cable from PILOT INPUT Jack J17 on the combiner and observe that the RADIO PILOT fault indicator lamp on the receiver control panel goes on.

J. Reconnect the patch cord to the PILOT INPUT jack.

K. Set the PILOT DEFEAT switch on noise amplifier 6A8 to ON.

L. Set the PILOT DEFEAT switch on the combiner to ON.

M. Adjust NOISE AMPL PILOT LEVEL ADJ control R4 for a reading of -3 volts.

N. Set both PILOT DEFEAT switches to OFF.

O. Adjust NOISE AMPL PILOT BIAS ADJ control R86 for a reading of -75 volts on the AC-DC VTVM and observe that NOISE AMPL fault indicator lamp DS3 on the receiver control panel goes on.

P. Slowly readjust the NOISE AMPL PILOT BIAS ADJ control until NOISE AMPL fault indicator DS3 goes out, for a reading of 3 volts on the AC-DC VTVM.

Q. Remove the patch cord from the PILOT INPUT jack on the combiner and observe the following.

1. The AC-DC VTVM indicates -75 volts.

2. NOISE AMPL fault indicator lamp DS3 and RADIO PILOT fault indicator lamp DS4 on the receiver control panel goes on.

R. Reconnect the patch cord to the PILOT INPUT jack.

S. Initial data sheet if all indicators operate properly.

9.6 Antenna System VSWR

9.6.1 Test Equipment

A. Frequency Counter, HP 524B

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B. Signal Generator, HP 612A

C. Oscilloscope, Tektronix Model 317

D. Sweep Generator, Jerrold 900A

9.6.2 Procedure

A. Connect the equipment as shown in Figure 12.

B. Set the Frequency Out Control on the signal generator to the center frequency of the Receiver.

C. Set the Frequency Out Control on the sweep generator to the center frequency of the Receiver.

D. With the delay cable unterminated, set the controls of the Tektronix oscilloscope to obtain a display 18 spaces high as shown in Figure 13A.

E. Adjust the sweep generator sweep width to produce a display on the oscilloscope approximately 5 mc wide.

NOTE: Maintain the lowest possible output level from Sweep Generator to obtain the desired display.

F. Disconnect the antenna cable at the input to the preselector and connect the delay cable to the antenna cable as shown in Figure 12.

G. Measure the height of the trace on the oscilloscope at the center frequency Fc. The height should be 3 spaces maximum as shown in Figure 13B.

H. Compute and record the VSWR using the following formula:

$$VSWR = \frac{MAX\ H \not/ MIN\ H}{MAX\ H - MIN\ H}$$

Where: MAX H is the height of oscilloscope display at Fc (set of 18 boxes) with delay cable unterminated.

MIN H is the height of oscilloscope display at Fc with delay cable terminated in the antenna (3 boxes maximum for VSWR of 1.4)

Example: MAX H = 18 boxes, MIN H = 1 box

$$VSWR = \frac{18 \not/ 1}{18 - 1} = \frac{19}{17} = 1.12$$

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10. AN/FRC-39 OVERALL TESTS (FORM BRII/74)

10.1 System Intermodulation

10.1.1 Test Equipment

A. Performance Monitor, Bays 1 and 2

10.1.2 Preliminary

A. Before performing this test remove the order wire and pilot tone inputs to the exciter and defeat the exciter transfer circuit.

B. Operate the pilot tone defeat switch to the ON position on the receivers. Disconnect the pilot tone and combiner interconnects.

10.1.3 Procedure

A. Connect the equipment as shown in Figure 14.

B. Turn the TEST SELECTOR switch on monitor converter to LOOP.

C. Modulate the exciter with noise across the entire baseband.

D. Set the output level of the noise generator for the proper value as follows:

1. Connect a patch cord between LF MULT jack J12 on the noise generator and the 75 ohm INPUT jack J5 on ac voltmeter.

2. Adjust LF LEVEL ADJUST on the noise generator panel to obtain a reading of -23 dbm on the voltmeter.

3. Remove the patch cord from LF MULT jack J12 and connect the cord to HF MULT jack J18 on the noise generator.

4. Adjust HF LEVEL ADJUST on the noise generator panel to obtain -14.5 dbm reading on the voltmeter.

E. To insert the bandpass filter in series with the receiver output, make the following patch connections at the noise analyzer.

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1. Connect OUT jack J8 to the 15 KC OUT jack.
2. Connect IN jack J7 to the 15 KC IN jack.
3. Turn AUDIO CHANNEL switch S1 to 15 KC.
4. Turn the two INTERMODULATION CAL control to O.
5. Turn CHANNEL SWITCH S2 to AUDIO.

F. Establish the receiver output reference level by adjusting the METER LEVEL control until the noise analyzer meter reads 50.

G. Insert a band reject filter in the modulator input by making the following patch connections at the noise generator panel:

1. Connect IN jack J3 to the 15 KC in jack.
2. Connect OUT jack J6 to the 15 KC OUT jack.
3. Readjust the output levels as instructed in Step D.

H. Measure and record the intermodulation noise in the 15 KC frequency slot as follows:

1. Adjust the two INTERMODULATION CAL controls until the noise analyzer meter indicates 50.
2. Record the amount of intermodulation read directly from the INTERMODULATOR CAL controls.

I. Measure and record the intermodulation noise in the 55 kc frequency slot by repeating Steps A through H. To make this measurement, install 55 kc filters in place of the 15 kc filters and place the audio channel switch in the 55 kc position.

J. Measure and record the intermodulation noise in the 80 KC frequency slot by repeating Steps A through H. To make this measurement, install 80 KC filters in place of the 55 KC filters installed in Step 1 and place the audio channel switch in the 80 KC position.

K. Measure and record the intermodulation noise in the 475 KC frequency slot by repeating Steps A through H. To make this measurement, install 475 KC filters in place of the 80 KC filters installed in step J and place the audio channel switch in the 475 KC position.

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L. Repeat Steps A through K using the same exciter, power amplifier with a second receiver.

M. Repeat Steps A through L using the second exciter, power amplifier combination with the second pair of receivers.

10.2 Exciter - Receiver Baseband Response

10.2.1 Test Equipment

A. Performance Monitor, Bays 1 and 2

10.2.2 Preliminary

A. Before performing this test, remove the low frequency, high frequency and order wire modulator inputs and the pilot tone for the exciter being used in the test.

B. On the receiver being used in the test, operate the pilot tone defeat switch to the ON position and disconnect the pilot tone and combiner interconnects.

10.2.3 Procedure

A. Connect equipment as shown in figure 15.

B. Turn TEST SELECTOR switch S 1 on monitor converter 13A12 to loop.

C. Turn INPUT SELECTOR switch S1 on ac voltmeter 13A8 to 75 ohm.

D. Set baseband oscillator 14A12 for 30 KC and adjust the output level controls for -20 dbm.

E. Remove the patch cord from the baseband oscillator READ LEVEL 75 OHM jack and connect the cord to the 75 OHM MULT jack on bay 1 jackfield 13A7.

F. Observe and record the reading on the ac voltmeter.

G. Maintaining constant input level, vary the baseband oscillator frequency from 12 to 60 KC. Measure the response of the output in reference to the 30 KC reading.

H. Record the response.

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I. Remove the patch cord from J21 (LF Input) and connect to J3 (HF Input) of the Exciter.

J. Maintaining constant input level, adjust the baseband oscillator frequency to 64 KC, 150 KC, 308 KC, 450 KC and 552KC respectively.

K. Record response which should be $\pm$ 0.25 db for each 250 KC of frequency change from the 64 KC reference level.

L. Repeat steps A through I using the same exciter with the second receiver.

M. Repeat steps A through L using the second exciter, with the second pair of receivers.

11. AN/FRC-39 LINK TESTS (FORM BRII/75)

11.1 The station-to-station tests interrupt normal operation of the radio set. Therefore, before proceeding with a link test procedure, notify the control center and obtain a release of equipment. Also, notify the adjacent station, indicate which test will be performed, and have the adjacent station proceed with preparation of equipment as directed.

11.2 Radio Noise and Spurious Tone Levels

11.2.1 Test Equipment

A. Voltmeter, Sierra 125A

11.2.2 Procedure

A. At the transmitting station, remove all order wire, low frequency, and high frequency modulation inputs to the exciter. The pilot tone input will not be disconnected for this test.

B. At the receive station, set function selector switch on the voltmeter to SEL VM 250 cycles and line impedance switch to 600 ohms.

C. Terminate the output of the receivers with a 75 ohm resistor between J-14 of BB/OW Panel 6A6 and ground.

D. Connect the voltmeter across the 75 ohm terminating resistor.

E. Turn the frequency control on the voltmeter so as to scan the baseband frequencies while receiving an RF signal from the adjacent transmitting station.

F. Record all noise signals appearing on the voltmeter which are greater than -60 dbm. Do not record the signal at 60 KC since this is the pilot tone frequency.

G. Reverse all test connections so that the transmitting station now receives and repeat steps A through F.

NOTE: Since the Sierra 125A voltmeter provides direct dbm measurements for voltages appearing across a 600 ohm load, the noise indicated on the voltmeter in this test will be 9 db lower than actual level. Therefore, add 9 db to all readings before recording.

11.3 Radio Baseband Frequency Response

11.3.1 Test Equipment

A. Performance Monitor, Bays 1 and 2.

11.3.2 Procedure

A. Set up equipment as shown in figure 16 transmitting station.

B. Set the baseband oscillator frequency for 30 KC and adjust the output level for -20 dbm.

C. Remove the combiner interconnections from the receivers that are out of service.

D. Set up equipment as shown in figure 16 receiver station.

E. With the transmitting station sending the signal in step C, the receiver station should read a level of -10 dbm on the ac voltmeter.

F. While maintaining a constant input level the transmitting station will vary the baseband oscillator frequency from 12 to 60 KC.

G. The receiving station will measure and record the output on the ac voltmeter with respect to the 30 KC level.

H. At transmitting station, remove patch cord from J21 (LF input) and connect it to J3 (HF input).

I. Maintaining a constant input level, adjust the baseband oscillator frequency to 64 KC, 150 KC, 308 KC, 450 KC, and 552KC respectively.

J. Measure and record the output at the receiving station with respect to the 64 KC level.

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Test Procedures Radio Set AN/FRC-39	CODE IDENT. NO. 14842	DWG. SIZE A	6272894	A
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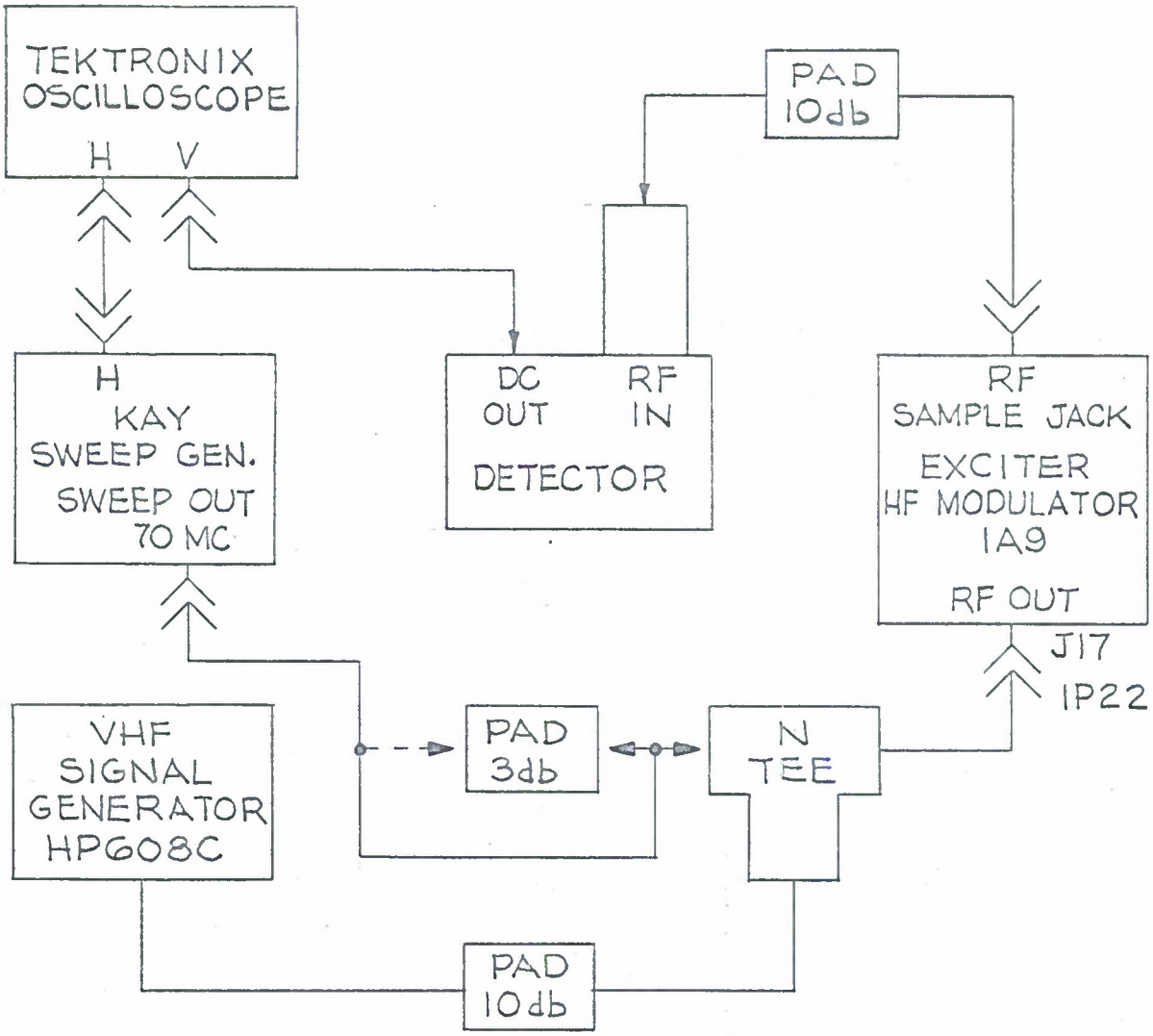

FIGURE 1

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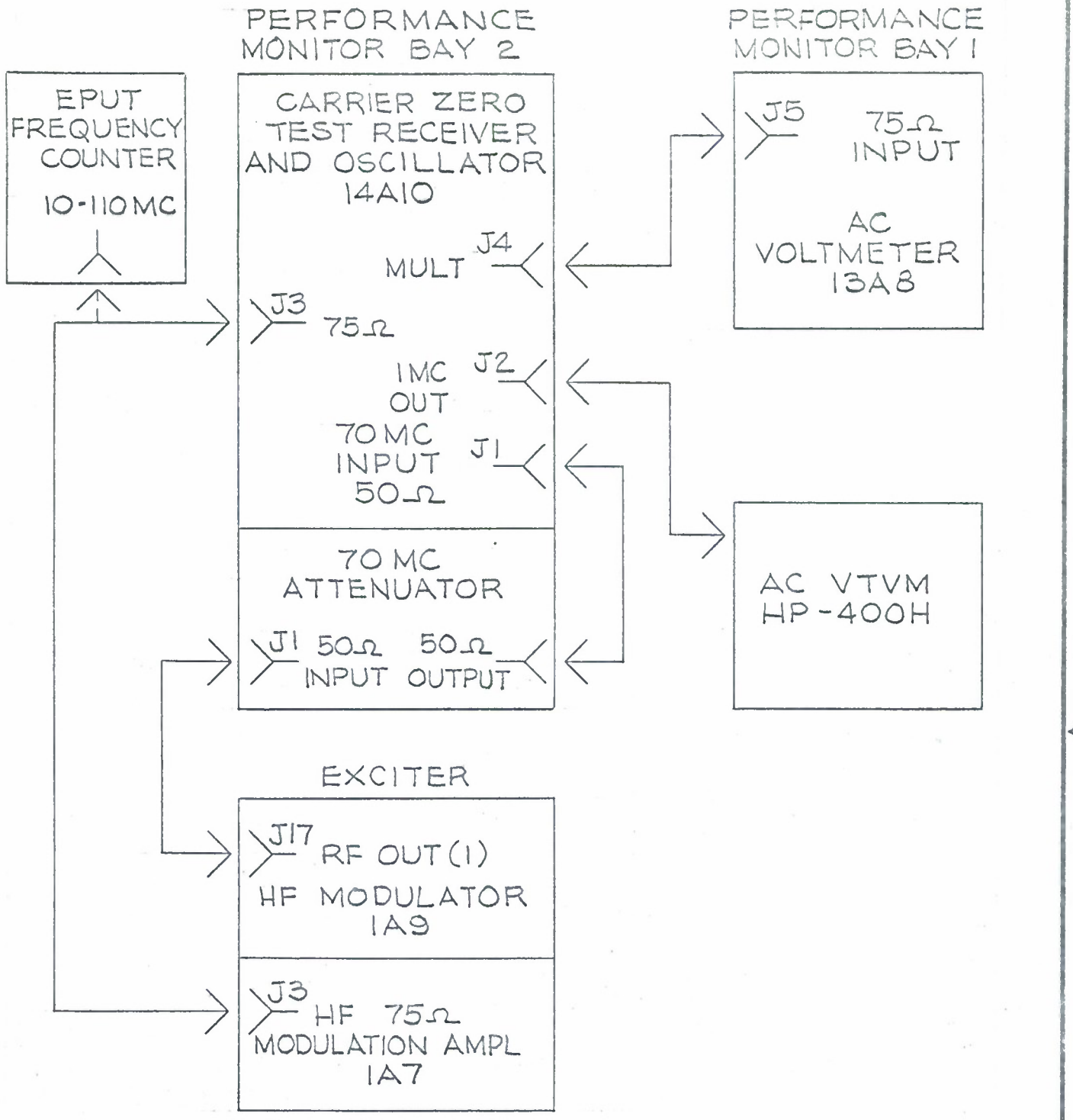

FIGURE 2

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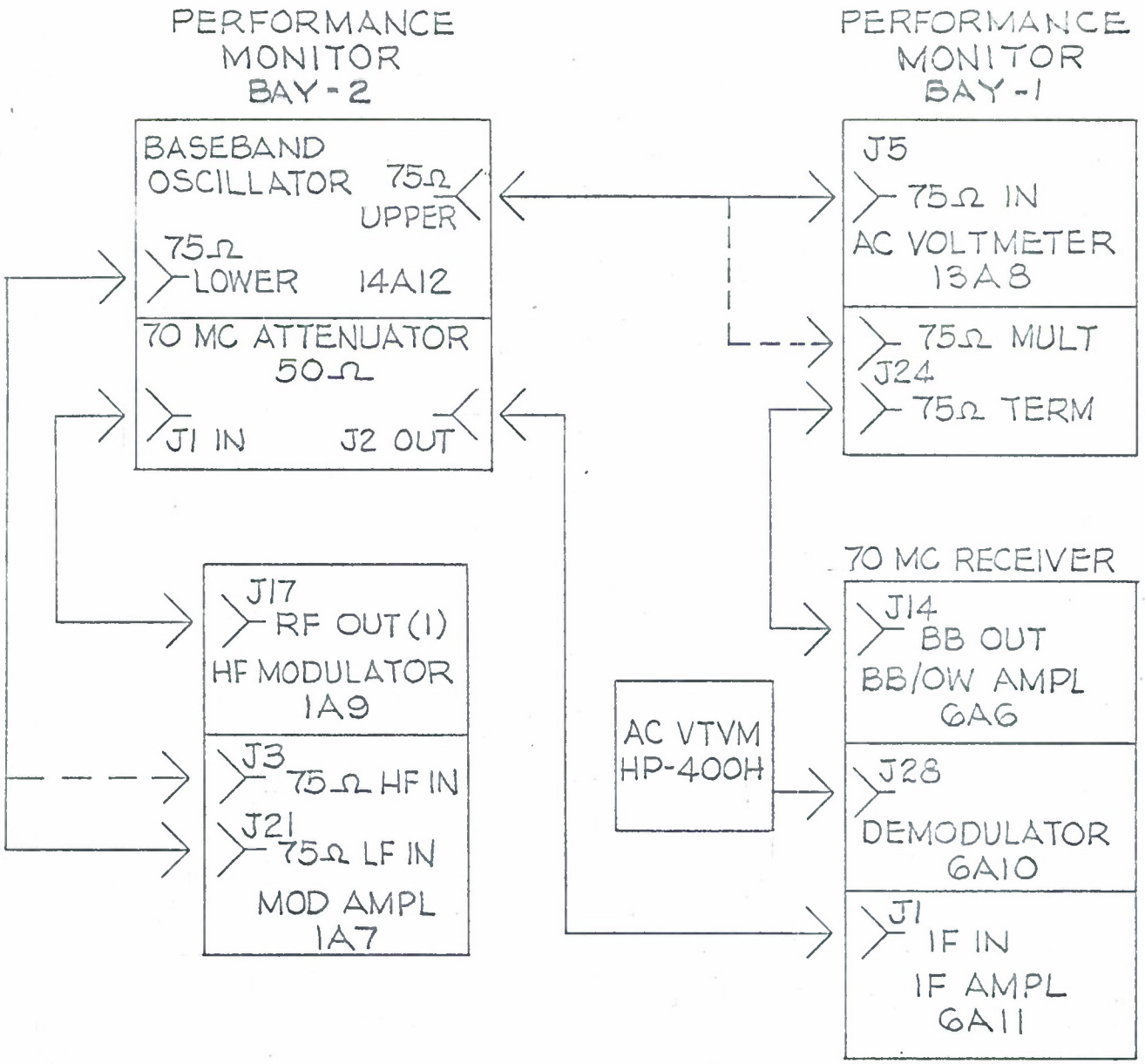

FIGURE 3

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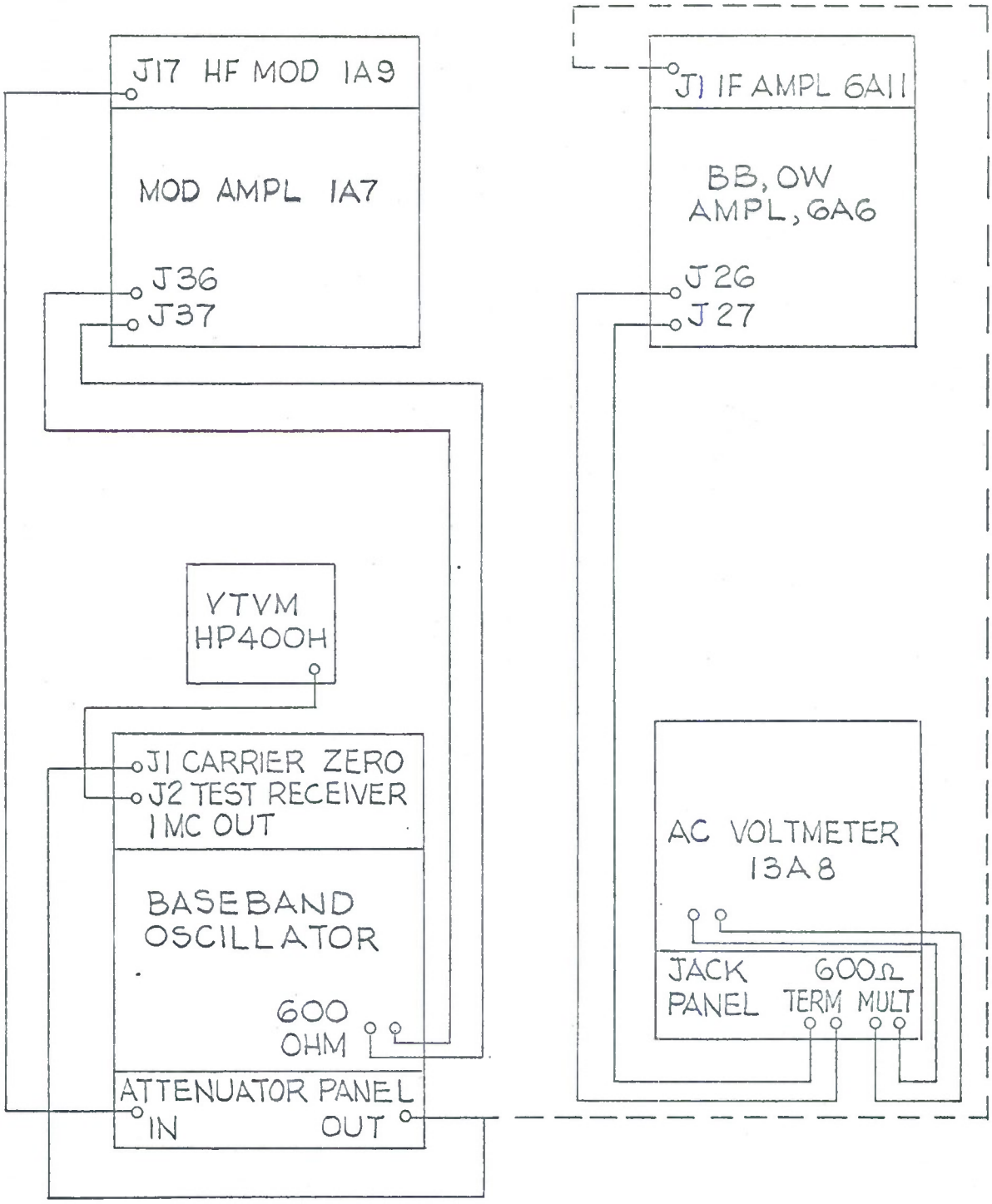

FIGURE 4

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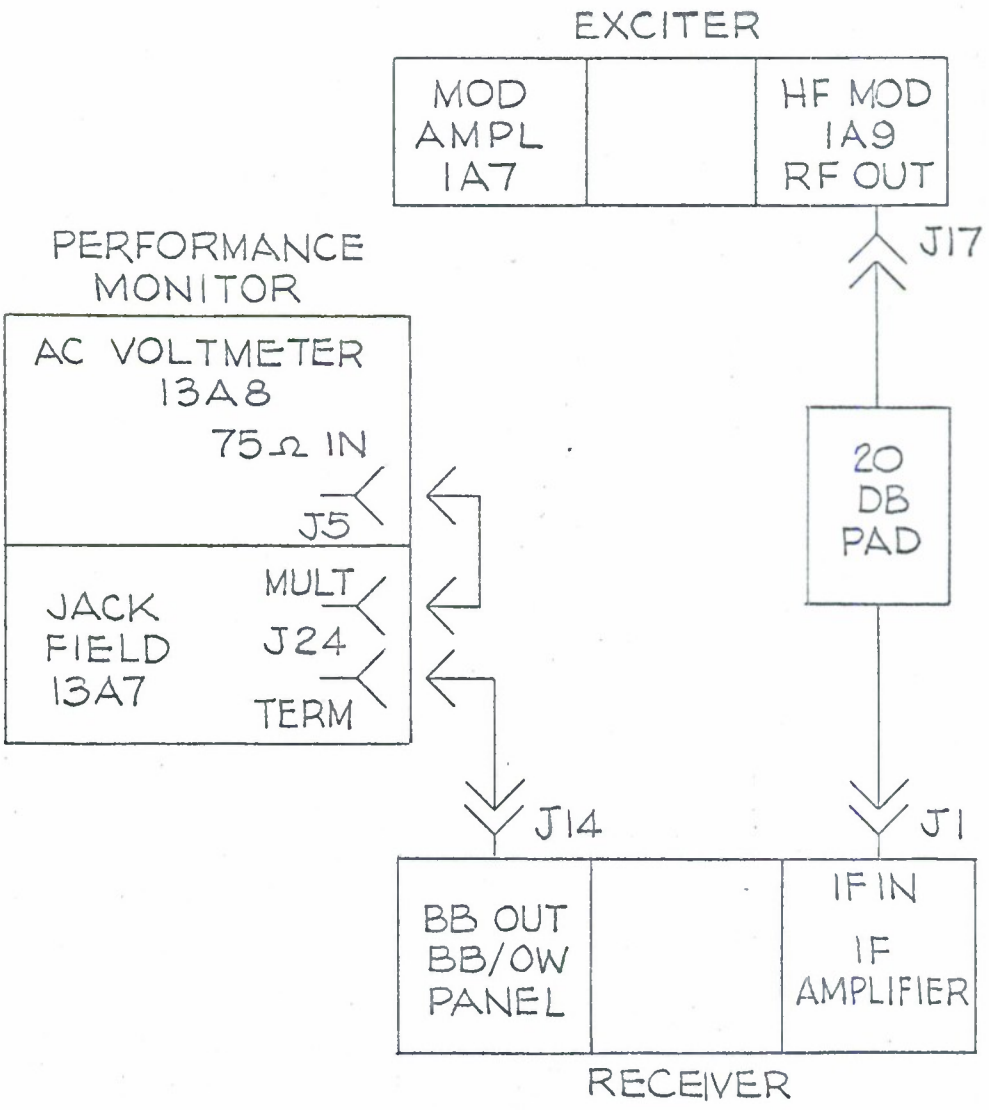

FIGURE 5

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APPROVED BY [illegible] DATE 3/17/69		FEC NO.	SHEET 30

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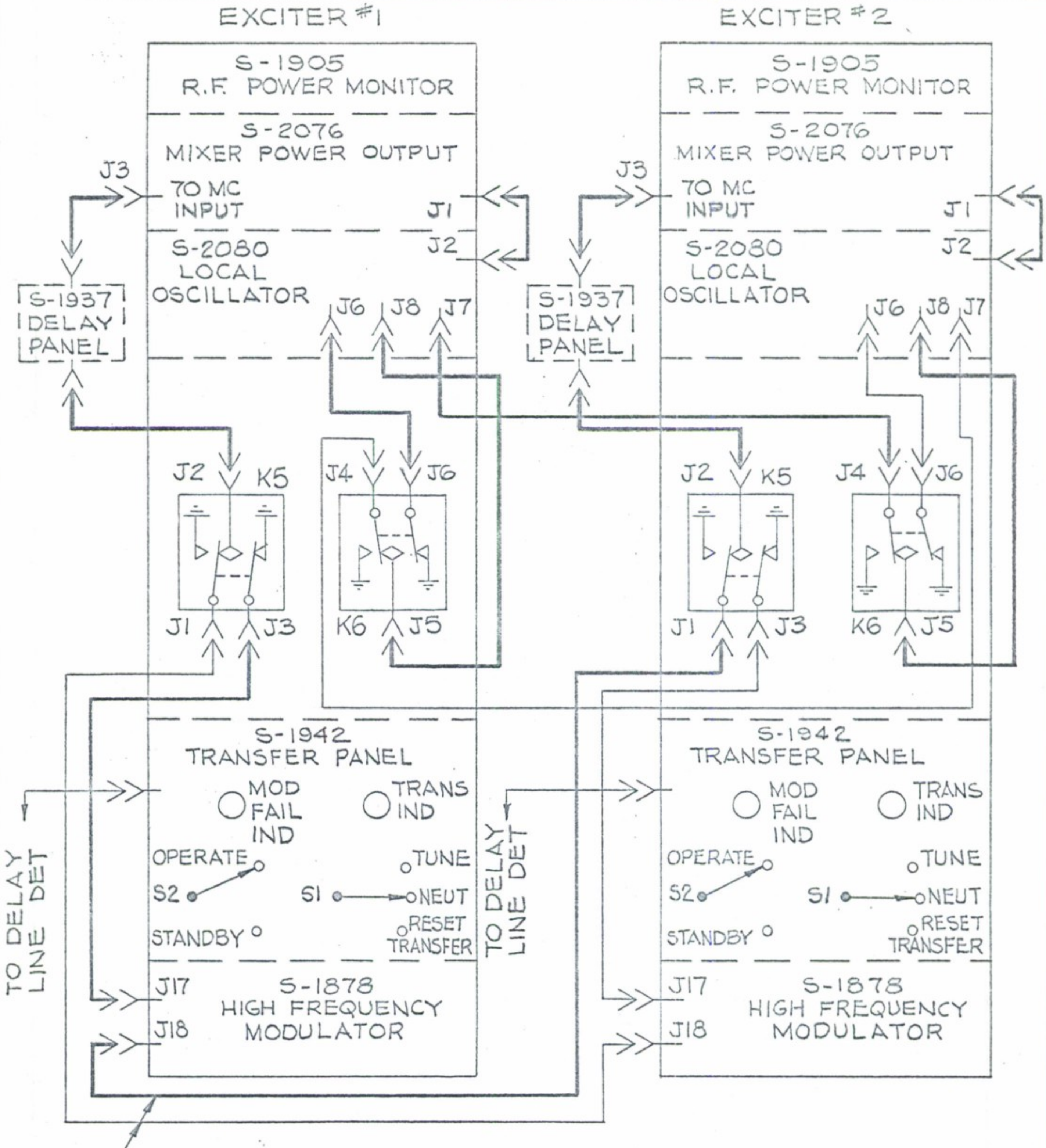

FIGURE 6

NOTE

HEAVY CABLES INDICATE SIGNAL PATH

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631

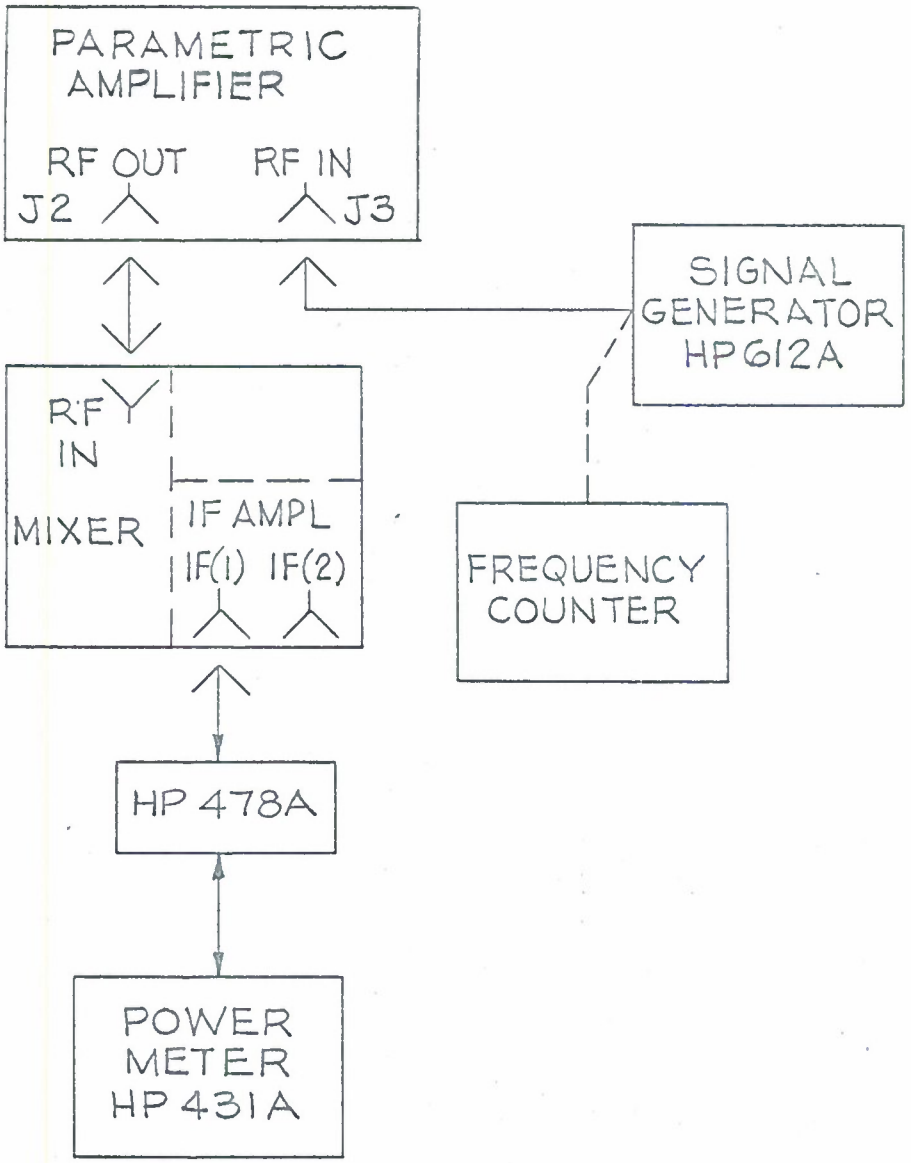

FIGURE 7

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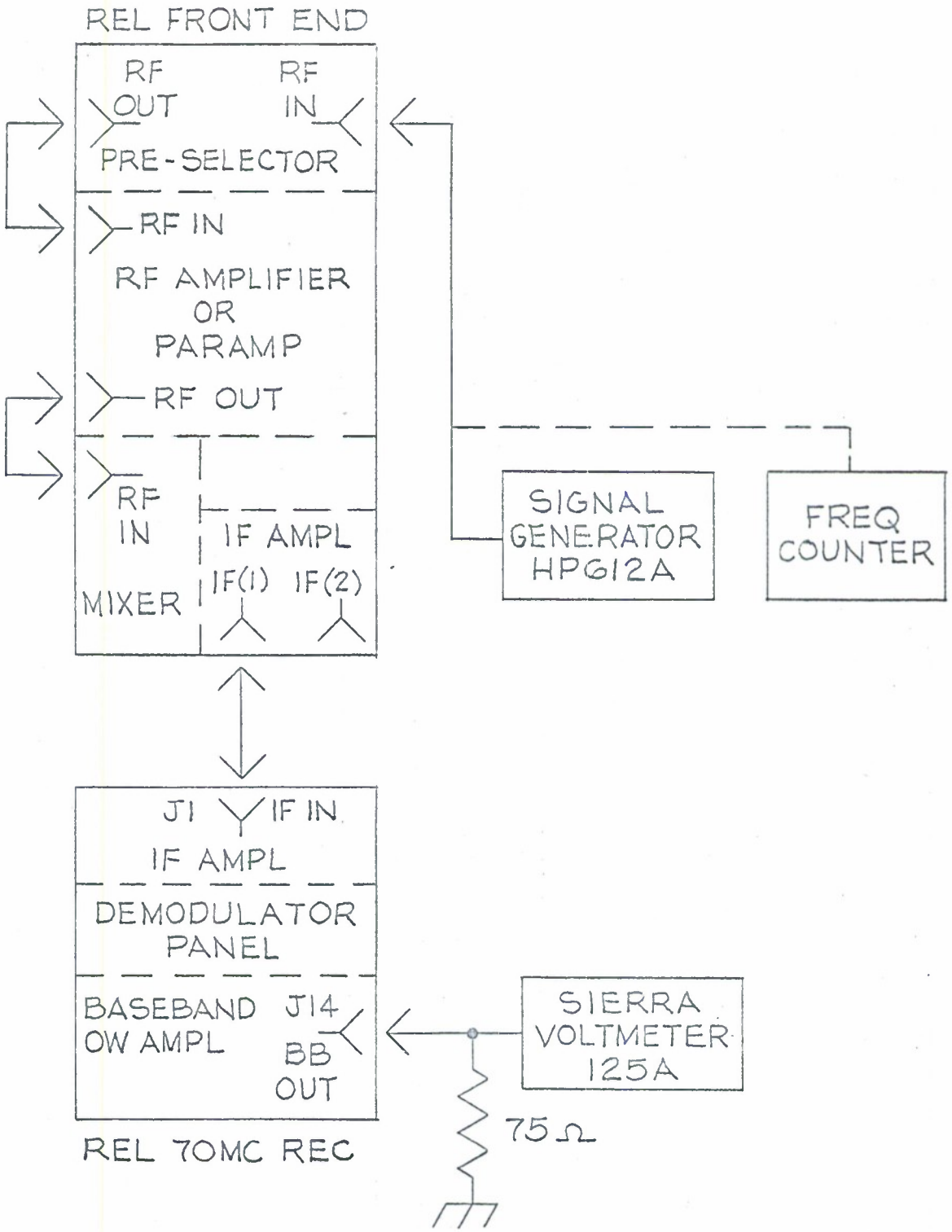

FIGURE 8

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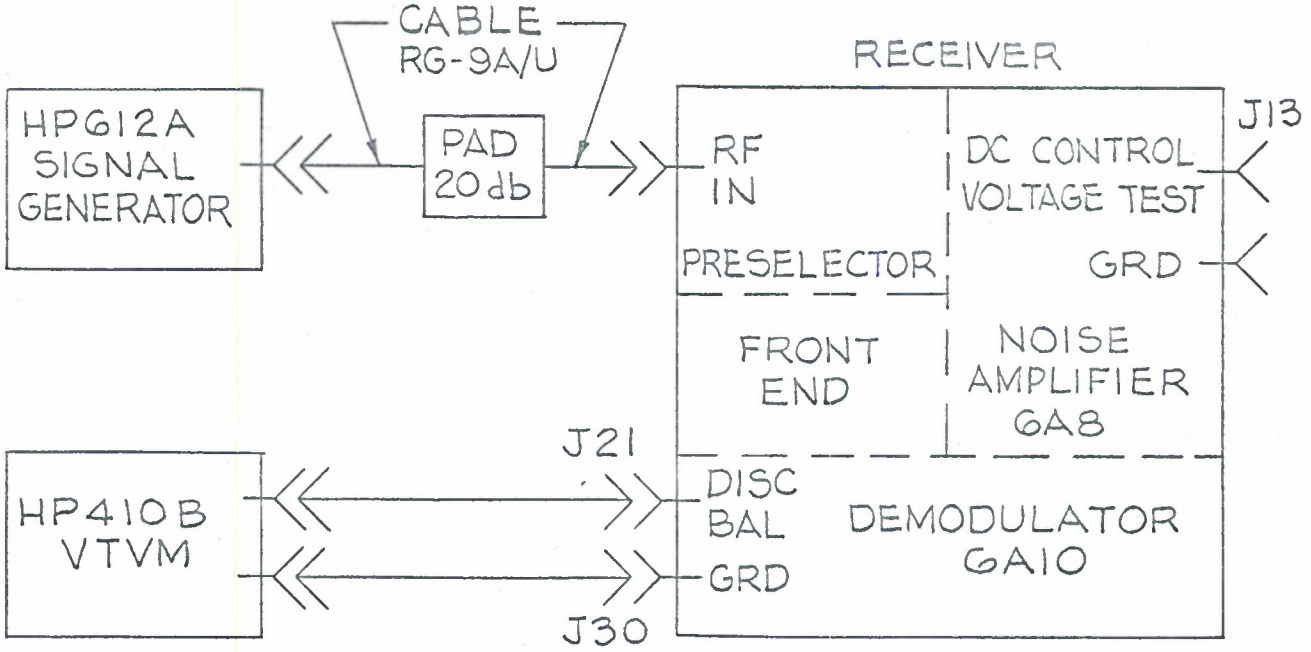

FIGURE 9

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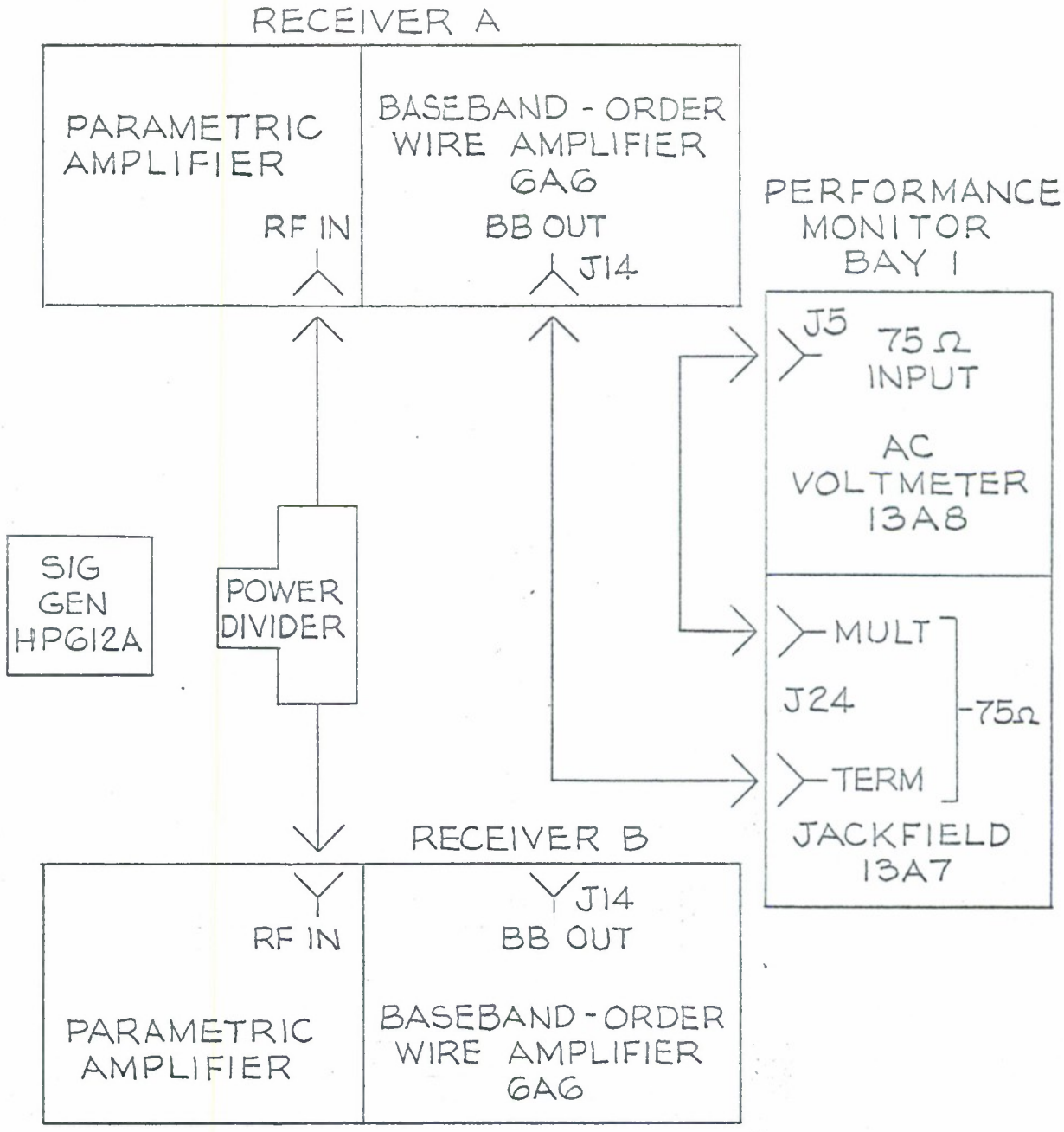

FIGURE 10

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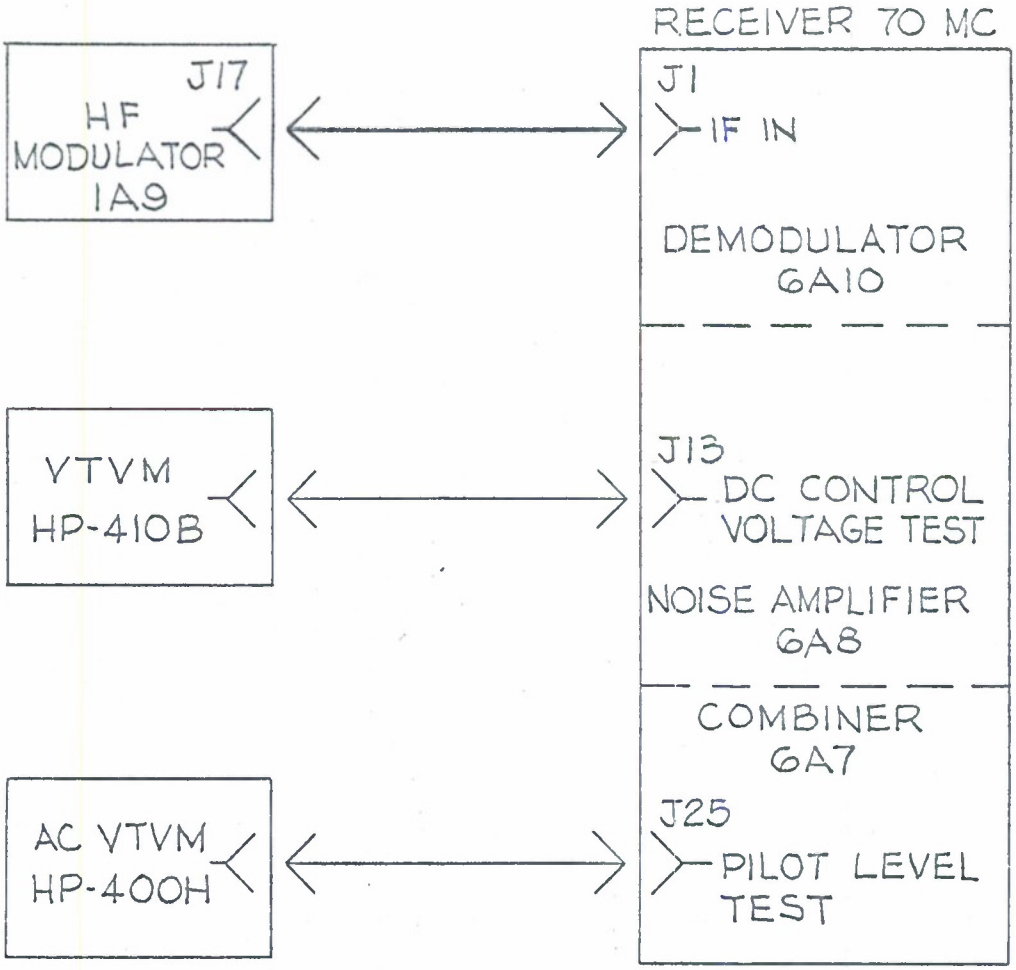

FIGURE 11

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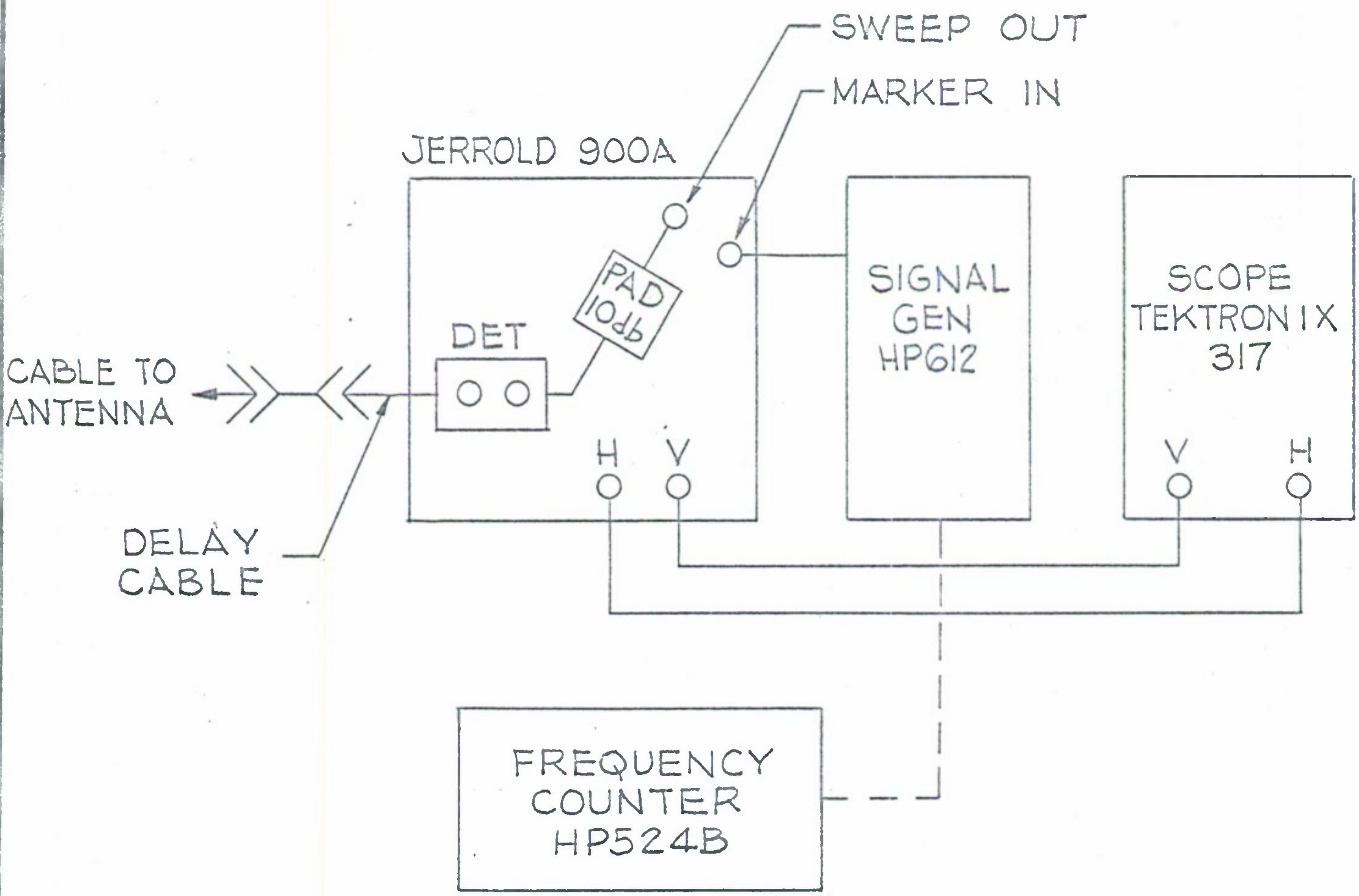

FIGURE 12

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DRA[redacted]NG [redacted]MBER 6272894 37

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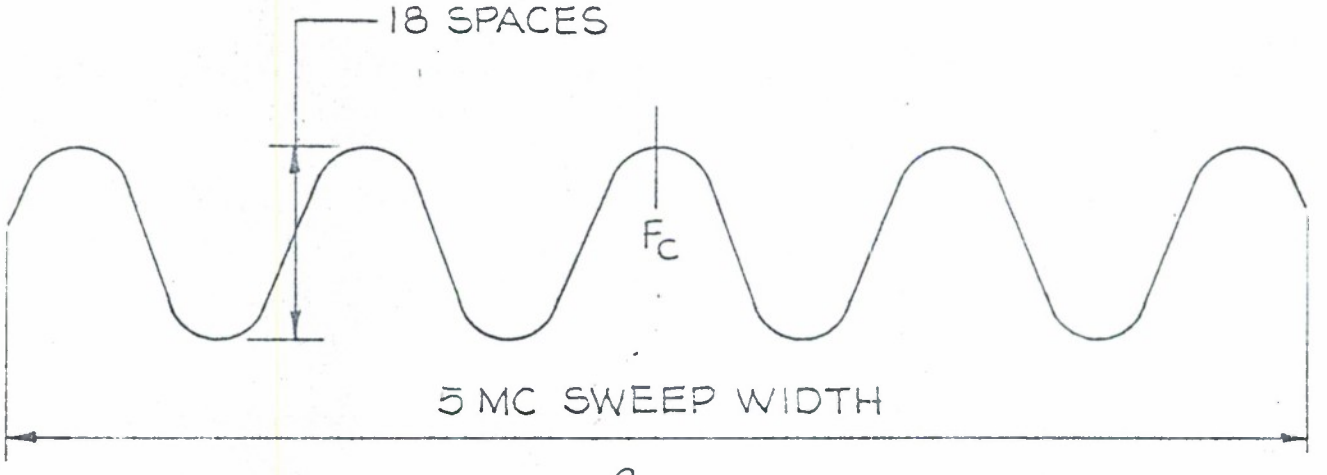
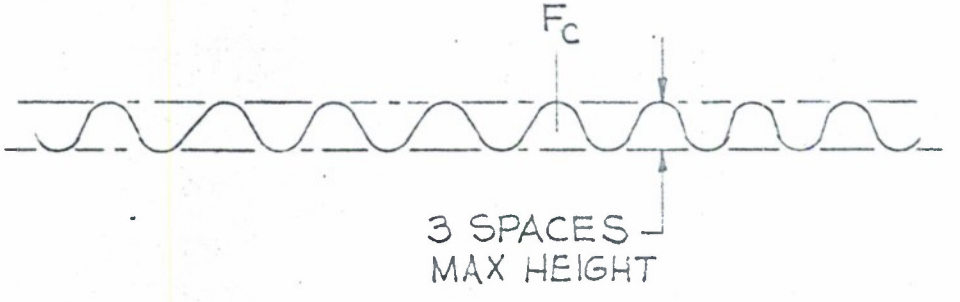
[illegible]	3/17/64			



a.



b.

FIGURE 13

a. DELAY CABLE UNTERMINATED
b. DELAY CABLE TERMINATED

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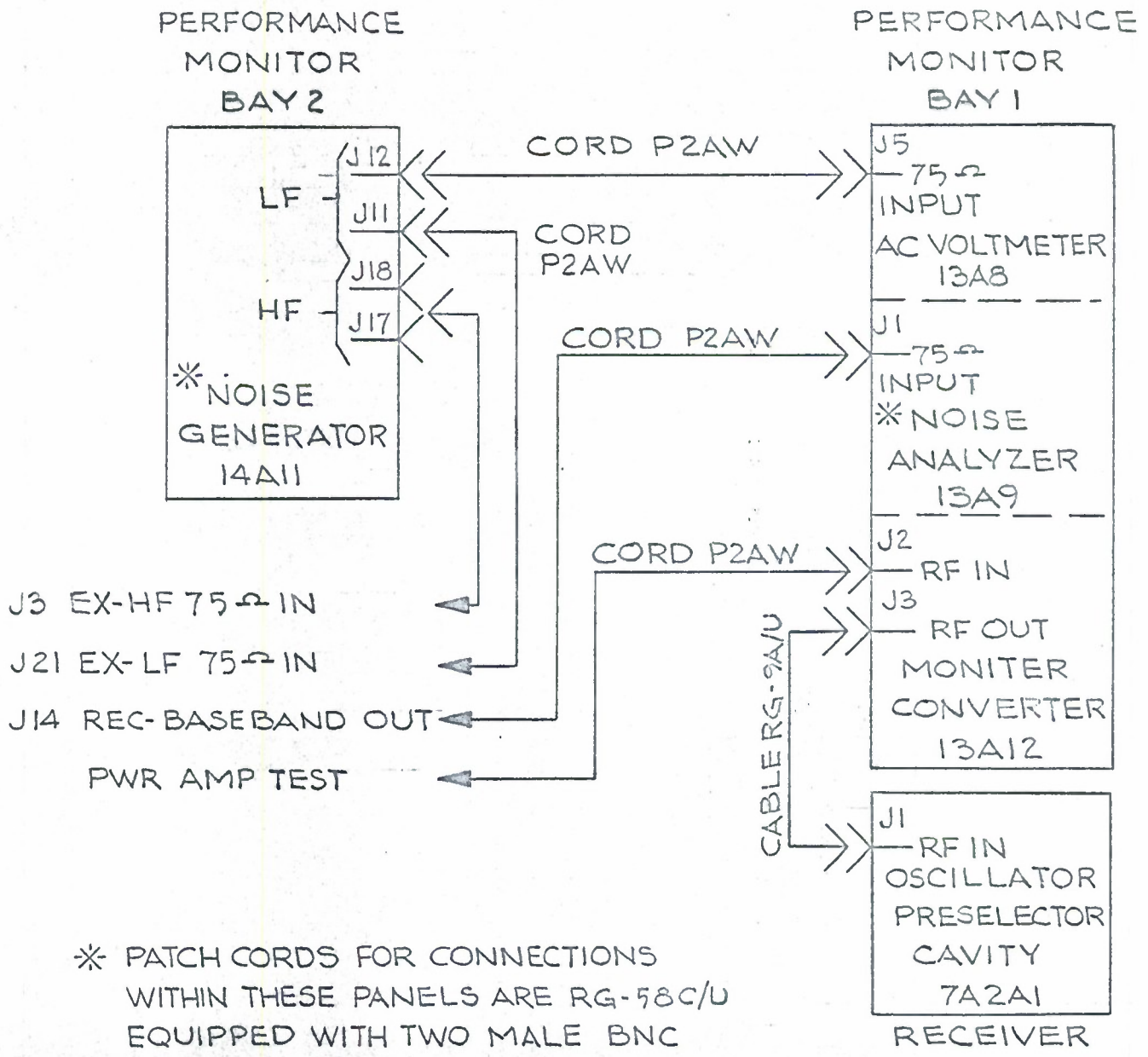

* PATCH CORDS FOR CONNECTIONS WITHIN THESE PANELS ARE RG-58C/U EQUIPPED WITH TWO MALE BNC CONNECTORS.

FIGURE 14

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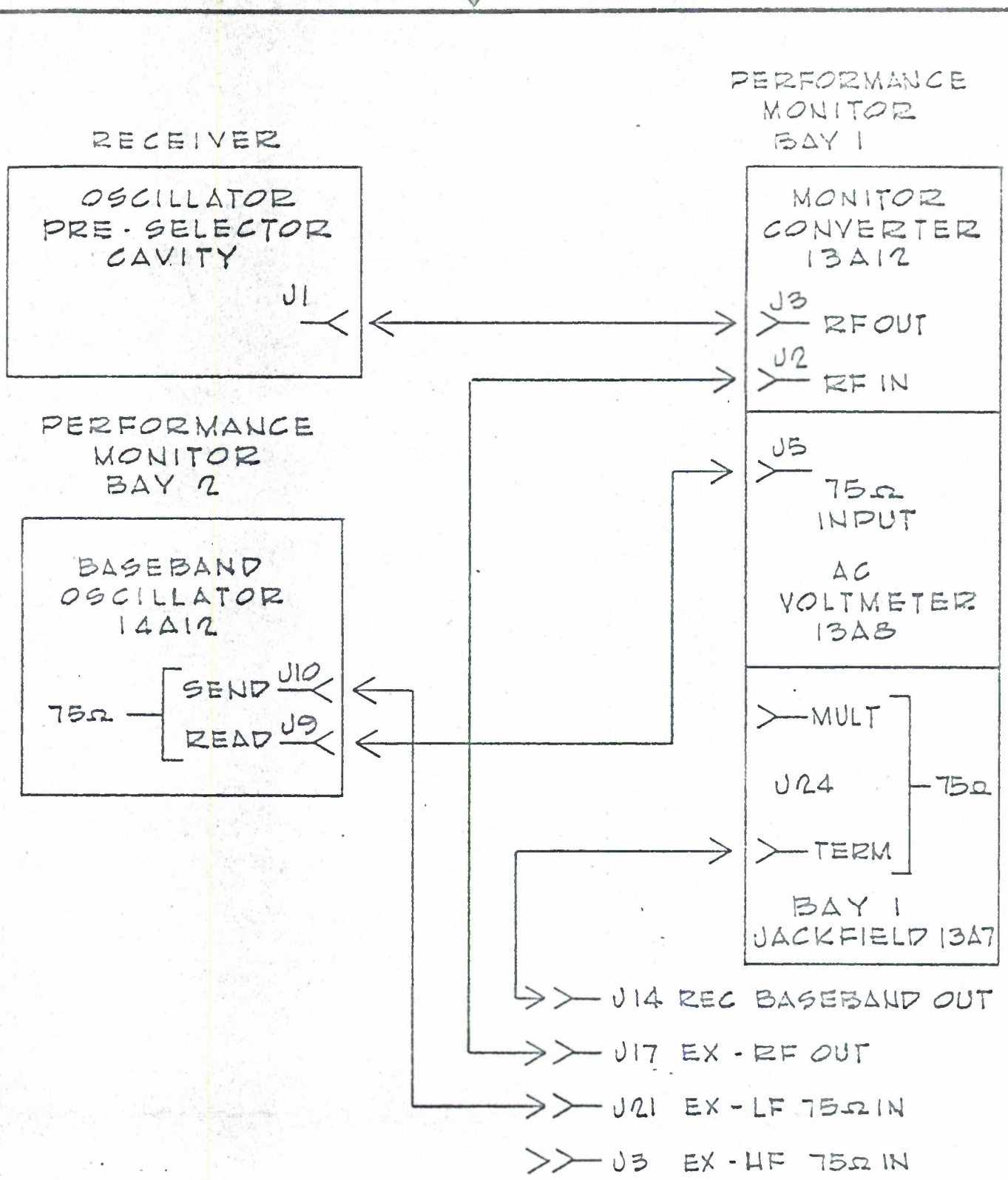

FIGURE 15

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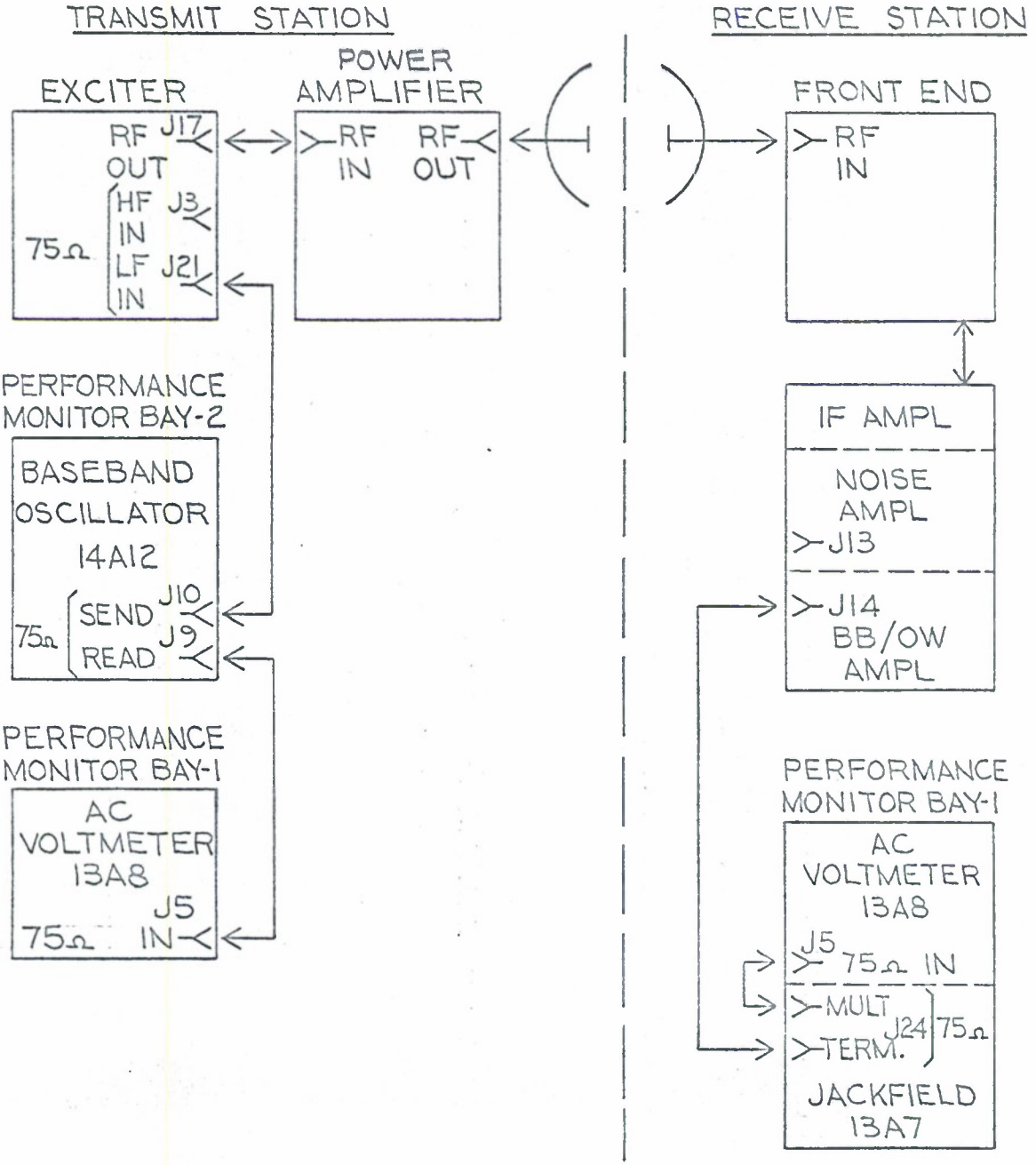

FIGURE - 16

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2b. GROUP

3. REPORT TITLE

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4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

TEST PROCEDURES

5. AUTHOR(S) *(Last name, first name, initial)*

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13. ABSTRACT

Test procedures for Radio Set ANITRC-35, Los MICROWAVE MW503A Radio Set AN/MR-80, Radio Set AN/MRC-85, Radio Set AN/FRC-39, for System 486L

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